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THE FOLLOWING PAGES ARE CHANGES

TO BASIC DOCUMENT

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	25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48	A A A A A A A A A A A A A A A A A A B B B B B						
	49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87	B C C C C C C C C C C C C C C C C C						

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8.1

This section of the document describes the data changes created by converting a production line Minuteman missile into a CTLI missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check list, and ECP lists applicable to this installation. Page 71 summarizes the complete installation mass properties and consists of data from page 72 (average mass properties of downstage components), page 73 (predicted sealant changes), and page 77 (actual weight of CTLI section S/N 0000024). In addition, page 74 presents summary check lists by production section as backup data for page 72. Page 78 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01BR-NMFD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

8.2 WEIGHT & BALANCE SUMMARY TOTAL CELL KIT INSTALLATION CELL WAFER 3/W 0000024						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			150.4	54.8	99.8	100.3	.004	.002
5			Silo							
6			Aero							
7	42	G&C Section			7.4	66.8	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			16.1	81.9	108.3	117.2	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			21.1	68.6	111.6	120.2	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.3	112.6	121.4	0	.008
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.4	55.6	112.2	120.6	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.4		55.6	112.2	120.6		
37	47	Interstage 1-2			25.7	73.9	114.8	125.2	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			30.8	111.0	117.7	130.0	0	.027
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.6	74.7	119.3	128.6	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			284.0					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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8.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____				
						DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG. *	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	53.9	107.5	110.6		
5			Silo							
6			Aero							
7	42	G&C Section			6.96	66.9	112.0	114.3		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			15.94	81.9	108.3	117.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.88	57.7	110.3	117.8		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.88		57.7	110.3	117.8		
22	45	Interstage 2-3			20.94	68.4	111.7	120.4		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.3	112.6	121.4		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.41	55.6	112.2	120.6		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.41		55.6	112.2	120.6		
37	47	Interstage 1-2			25.21	73.5	115.1	125.6		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			23.98	109.7	117.7	130.1		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.43	74.1	119.3	128.5		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.29					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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8.2 THE 3-62 GEMINI DETALLED AT VANDENBERG AIR FORCE BASE						REPORT NO. _____				
						DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10-3	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	55.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			.2	53.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3			.2	85.0	103.0	101.8		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			0	-	-	-		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2			.5	94.7	102.0	103.4		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boasting Section Stations (See Missile Station Diagram)  
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8.4.1 ACTUAL WEIGHT RECORD - CTLI SECTION			
U/O MISSILE 0000024	DR WING NO. 25-25402-35	CHECK LIST NO. 39	REPORT NO. WTS-1033-024
MISSILE MODEL VB-133A	CON	REPORTED BY CB/RB	PAGE NO.
CONFIGURATION	ADCN	CHECKED BY	DATE 7/9/63

LONGITUDINAL REFERENCE DATUM

LATERAL REFERENCE DATUM

VERTICAL REFERENCE DATUM

WEIGHING DATA				DIMENSIONAL DATA				
REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	DTL. INCHES	DIM. INCHES	DIM. INCHES
RE	58.60	27.00		31.60	AF	42.007	EA	84.510
RH	46.95	20.55		26.40	AH	42.023	EB	84.505
RE	97.85	55.05		42.80	BE	62.996	FC	115.490
BI	102.50	63.15		39.35	EG	62.999	FD	115.495
TOTAL	305.90	165.75		140.15	C	50.000	H	100.000
					D	60.000		

LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RE	31.60	42.007		EA	45.90	84.510		ES	28.45	77.478	
RH	26.40	42.023		EB	28.45	84.505		ED	29.75	77.481	
RE	42.80	62.996		FC	36.05	115.490		RA	45.90	115.500	
BI	39.35	62.999		FD	29.75	115.495		RC	36.05	115.500	
TOTAL	140.15	7,612.1		AS AGD	140.15	99.71	13,974.5	AS AGD	140.15	99.71	13,974.5

(RA) = Rear Reaction

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SERIAL NUMBER: 0000024

CHECK LIST NO.	DATE	8.4.2 MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE)				COMPONENT	MISSILE
			Mo	Day	Yr			
39		MODEL: WS-135A						
		FINAL ASSEMBLY DRAWING NO. 25-25402-35						
SECTION 39		MISSILE NO.						
MISSILE COMPONENT: CTLL		COMPONENT PART NO. Noted						
DESCRIPTION		PART NO.	WEIGHT	X ARM	Y ARM	Z ARM		
39	Instrumentation Group-Trainer Test	25-37501-35						
39a	CTLL Structure Assy.	25-25403-11						
	Support Structure	25-25404-58						
	Primary Structure	25-25405-15						
	Insulation & External Markings	25-25406-35						
	Antenna & Spacers	25-25407-35						
	Plate-Identification	25-25408-329						
39b	Cable & Equipment Installation	25-25409-12						
	Battery, Squib	10-20942-2						
	Battery, Squib	10-20942-1						
	Cable Set SE-35B	55018-106						
	Cable	AI31277-315						
	Cable	AI31278-315						
	Cable	AI31279-315						
39c	Kit Installation (ECP 525)	25-25402-21						
39d	Kit Installation (ECP 551)	25-25402-26						
39e	Kit Installation (ECP 578)	25-25402-34						

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## 8.4.3

## WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR BOEING  
COMPONENT SECTION 39  
MODEL NO. WB-133A  
SERIAL NO. 0000024

CONTRACT NO. AP04(G47)-289REPORT NO. WBB-1033-024DATE 7/9/63PREPARED CB/MBAPPROVED OO

## EQUIPMENT CHANGE RECORD

## WEIGHT AND BALANCE

LINE	PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT				X AXIS				Y AXIS				Z AXIS			
			WEIGHT	ARM	MOMENT		ARM	MOMENT			ARM	MOMENT			ARM	MOMENT		
1	25-25402-	Instr. Group Trainer (As Weighed)	140.15	54.31	7,612.1		99.06	13,882.6		99.71	13,974.5							
2																		
3																		
4																		
5																		
6		AND:																
7	AN31276-315	Cable - Acoustics	3.86	74.2			115.5			102.8								
8	AN31279-315	Cable - Acoustics	2.08	50.4			106.9			111.4								
9																		
10																		
11																		
12																		
13	25-25402-	Instr. Group Trainer (Complete)	146.09	54.78	8,003.3		99.60	14,520.8		99.96	14,603.1							
14																		
15																		
16																		
17																		
18																		
19																		
20																		
21																		
22																		
23																		
24																		
25																		
26																		
27																		
28																		
29																		
30																		
31																		
32																		

8.5

# **ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO OCLI SUBSECTION S/N 0000004 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-113-1006)" as revised on 15 April 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (MS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, SRA Installation and Envelope Change	2	Negl.	Yes
236	Second Stage OCLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of SAC Bracket, Detonator Cord & OCLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of OCLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 OCLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 / 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
506	OCLI Raceway Cover Revision	1	- .2	Yes
525	OCLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	OCLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 OCLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Distrust Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to OCLI Umbilical Bracket- Section 49	1	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* These ECP's were incorporated during manufacture of the OCLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

**CELI SECTION, S/N 0000025**

**9.1**

This section of the document describes the data changes created by converting a production line Minuteman missile into a CELI missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CELI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CELI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will then supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECF lists applicable to this installation. Page 80 summarizes the complete installation mass properties and consists of data from page 81 (average mass properties of downstage components), page 82 (predicted sealant changes), and page 86 (actual weight of CELI section S/N 0000025). In addition, page 83 presents summary check lists by production section as backup data for page 81. Page 87 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECF 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-MSD-1, "Nominal Mass Properties and Dispersions for Minuteman CELI/ACDS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CELI section which is an actual weight.

9.2 WEIGHT & BALANCE SUMMARY TOTAL CTE KIT INSTALLATION CTE WAYER S/N 0000025					REPORT NO. _____ DATE _____					
LINE	SEQ.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			149.0	54.7	99.7	100.3	.004	.002
5			Silo							
6			Aero							
7	42	G&C Section			7.4	66.8	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			16.1	81.9	108.3	117.2	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			-1.7	58.2	110.2	117.9	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	-1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			21.1	68.6	111.6	120.2	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.3	112.6	121.4	0	.003
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			-1.4	55.6	112.2	120.6	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	-1.4		55.6	112.2	120.6		
37	47	Interstage 1-2			25.7	73.9	114.8	125.2	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			30.8	111.0	117.7	130.0	0	.027
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.6	74.7	119.3	128.6	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			282.3					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Being Section Stations (See Missile Station Diagram)

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9.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____				
						DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	55.9	107.5	110.6		
5			Silo							
6			Aero							
7	42	G&C Section			6.96	66.9	112.0	114.3		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			15.94	81.9	108.3	117.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.88	57.7	110.3	117.8		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.88		57.7	110.3	117.8		
22	45	Interstage 2-3			20.94	68.4	111.7	120.4		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.3	112.6	121.4		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.41	55.6	112.2	120.6		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.41		55.6	112.2	120.6		
37	47	Interstage 1-2			25.21	73.3	115.1	123.6		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			29.98	109.7	117.7	130.1		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.43	74.1	119.3	125.5		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.29					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Posing Section Stations (See Missile Station Diagram)

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9.2 BMS 5-62 CHANGES INSTALLED AT WARRINGTON AIR FORCE BASE**						REPORT NO. _____				
						DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	94.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	88.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			.2	53.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3			.2	85.0	109.0	101.8		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			0	-	-	-		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett							
37	47	Interstage 1-2			.5	94.7	102.0	103.4		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			.8	141.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	131.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Jettison Section Stations (See Missile Station Diagram)

2-5550-0-58\*\* Reference DE-1394-534

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9.4.1 ACTUAL WEIGHT RECORD - CTLI SECTION			
U/O MISSILE 0000025	DRAWING NO. 25-2502-15	CHECK LIST NO. 39	REPORT NO. WTS-1023-083
MISSILE MODEL WS-134	PCN	REPORTED BY RS/TY	PAGE NO.
CONFIGURATION TAV	ACON	CHECKED BY CB	DATE 6/20/63

LONGITUDINAL REFERENCE DATUM

VERTICAL REFERENCE DATUM

Direction of TARGET

WEIGHING DATA				DIMENSIONAL DATA			
REACTION	GR. WT.	TARE	CORR. NET WT.	REACTION	GR. WT.	TARE	CORR. NET WT.
RF	50.85	27.00	23.85	FC	81.30	39.90	41.40
RH	55.15	20.55	34.60	RD	67.35	43.35	24.00
RE	105.80	55.00	50.80	RA	63.75	23.30	40.45
RG	59.30	63.15	31.15	RB	93.10	59.15	33.95
TOTAL	305.70	165.70	139.80	TOTAL	305.50	165.70	139.80

LONGITUDINAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	23.85	42.007	1002.5	FC	41.40	77.478	3200.0
RH	34.60	42.007	1453.0	RD	24.00	77.478	1859.5
RE	50.80	66.926	3380.0	RA	40.45	115.900	4688.0
RG	31.15	66.926	2085.0	RB	33.95	115.900	3915.0
AS CG	139.80	94.23	13080.7	AS CGD	139.80	90.74	12633.6

(RR) = Rear Reaction

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SERIAL NUMBER: 0000025

CHECK LIST NO. 39		9.4.2 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)																	
DATE		MODEL WS-133A		FINAL ASSEMBLY DRAWING NO. 25-25402-35		COMPONENT				MISSILE											
		SECTION 39		MISSILE NO.						BASIC WEIGHT		AS WEIGHED		REMOTE SITE SHIPMENT		AS RECEIVED		REMOTE SITE		LAUNCH	
		MISSILE COMPONENT CTLLI		COMPONENT PART NO. Noted																	
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT		AS WEIGHED		REMOTE SITE SHIPMENT		AS RECEIVED		REMOTE SITE		LAUNCH				
39	Instrumentation Group-Trainer Test	25-37501-35																			
39a	CTLI Structure Assy.	25-25403-11																			
	Support Structure	25-29094-45																			
	Primary Structure	25-29093-15																			
	Insulation & External Markings	25-29095-3																			
	Antenna & Spacer	25-29096-3																			
	Plate-Identification	21-51600-329																			
39b	Cable & Equipment Installation	25-25404-14																			
	Battery, Squib	10-20942-																			
	Battery, Squib	10-20942-																			
	Cable Set SE-35B	55018-106																			
	Cable	AN37192-315																			
	Cable	AN37194-315																			
	Cable	AN37196-315																			
39c	Kit Installation (ECP 525)	25-37501-21																			
39d	Kit Installation (ECP 551)	25-25402-26																			
39e	Kit Installation (ECP 578)	25-25402-34																			

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## 9.4.3

## WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR	BOEING	CONTRACT NO.	AF04(647)-289	REPORT NO.	WBS-1023-085
COMPONENT	FUNCTION 39	LOT NO.		DATE	6/20/63
MODEL NO.	WS-133A	DRAWING NO.	25-25402-35	PREPARED	R. ST. ROMAIN
SERIAL NO.	0000025	U.C. MISSILE		APPROVED	B. WARRENDER

## EQUIPMENT CHANGE RECORD

## WEIGHT AND BALANCE

PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS	
			ARM	MOMENT	ARM	MOMENT	ARM	MOMENT
25-25402-35	Instr. Group Trainer (As Weighed)	139.80	54.23	7,580.7	99.00	13,840.5	99.74	13,943.6
AND:								
AN37194-315	Cable - Autonetics	3.32	74.2		115.5		102.8	
AN37196-315	Cable - Autonetics	1.32	50.4		106.9		111.4	
25-25402-35	Instr. Group Trainer (Complete)	144.14	54.64	7,893.6	99.45	14,365.1	99.92	14,431.9
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								

9.5

# **ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION** **APPLICABLE TO CTLI SECTION 8/W 000003 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 15 April 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PBS, SHA Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of GNC Bracket Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
506	CTLI Raceway Cover Revision	1	- .2	Yes
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

FOR ERRATA

**AD 404 314**

THE FOLLOWING PAGES ARE CHANGES

TO BASIC DOCUMENT

# ACTIVE PAGE RECORD

FROM MS 404314  
TO 404314  
#125

SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES					SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES				
			PAGE NO.	REV SYM	PAGE NO.	REV SYM	PAGE NO.				PAGE NO.	REV SYM	PAGE NO.	REV SYM	PAGE NO.
	1	A							49	B					
	2	B							50	B					
	3	B							51	B					
	4	B							52	B					
	5	B							53	B					
	6	B							54	B					
	7	B							55	B					
	8	B							56	B					
	9	B							57	B					
	10	B							58	B					
	11	B							59	B					
	12	B							60	B					
	13	B							61	B					
	14	B							62	B					
	15	B							63	B					
	16	B							64	B					
	17	B							65	B					
	18	B							66	B					
	19	B							67	B					
	20	B							68	B					
	21	B							69	B					
	22	B													
	23	B													
	24	B													
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	34	A													
	35	A													
	36	A													
	37	A													
	38	A													
	39	A													
	40	A													
	41	A													
	42	A													
	43	B													
	44	B													
	45	B													
	46	B													
	47	B													
	48	B													

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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
A	Revised pages 1, 4, 10.  Added pages 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42.  Added Moments of Inertia to page 10 Added Sections 3.0 and 4.0 to the document.	5/17/63	D. Brenden
B	Revised pages 2, 3, 4.  Added Sections 5.0 thru 7.0 to the document; and page 4.1	6/17/63	D. Brenden <i>DCB</i>

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1a  
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## CTLI SECTION, S/N 0000019

5.1-

This section of the document describes the data changes created by converting a production line Minuteman missile into a CTLI missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 44 summarizes the complete installation mass properties and consists of data from page 45 (average mass properties of downstage components), page 46 (predicted sealant changes), and page 50 (actual weight of CTLI section S/N 0000019). In addition, page 47 presents summary check lists by production section as backup data for page 45. Page 51 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-117PD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/ACDS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

5.2 WEIGHT AND BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000019						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			151.0	54.8	99.8	100.3	.004	.002
5			Silo							
6			Aero							
7	42	G&C Section			7.4	66.8	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			16.1	81.9	108.3	117.2	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.2		
22	45	Interstage 2-3			21.1	63.6	111.6	120.2	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.3	112.6	121.4	0	.008
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.4	55.6	112.2	120.6	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.4		55.6	112.2	120.6		
37	47	Interstage 1-2			25.7	73.9	114.8	125.2	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			30.6	111.0	117.7	130.0	0	.027
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.6	74.7	119.3	128.6	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			281.3					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\*Boeing Section Stations (See Missile Station Diagram)

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5.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x 10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	55.9	107.5	110.6		
5			Silo							
6			Aero							
7	42	G&C Section			6.96	66.9	112.0	114.3		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			15.94	81.9	108.3	117.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.85	57.7	110.3	117.8		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.88		57.7	110.3	117.8		
22	45	Interstage 2-3			20.94	68.4	111.7	120.4		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.3	112.6	121.4		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.41	55.6	112.2	120.6		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.41		55.6	112.2	120.6		
37	47	Interstage 1-2			25.21	73.2	115.1	125.6		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			20.2	102.7	117.7	130.1		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.43	74.1	119.3	128.5		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			136.20					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\*Boeing Section Stations (See Missile Station Diagram)

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5.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10-3	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			.2	53.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21		Jett		.2		53.6	110.8	116.7		
22	45	Interstage 2-3			.2	85.0	103.0	101.8		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			0	-	-	-		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36		Jett								
37	47	Interstage 1-2			.5	94.7	102.0	103.4		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\*\* Reference D2-13954-534

2-5550-0-58 \*Being Section Stations  
(See Missile Station  
REV. SYM. B Diagram)

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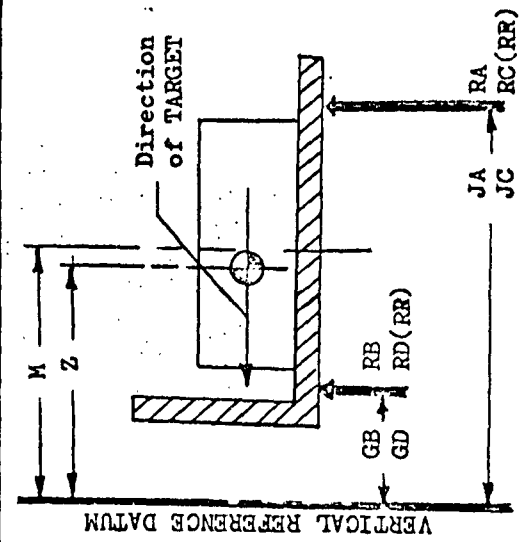
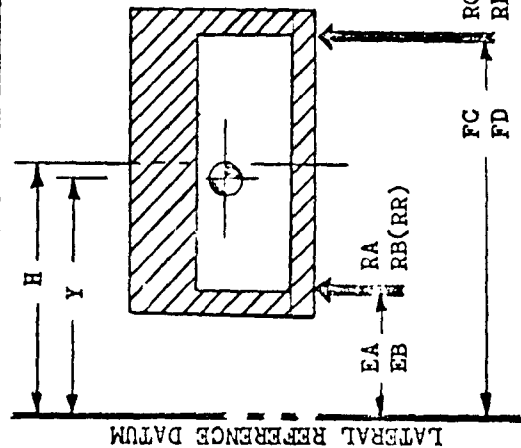
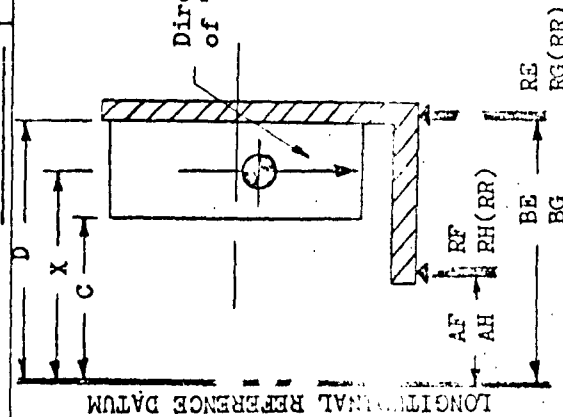




5.4.1

ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE C00019	DRAWING NO. 25-25402-35	CHECK LIST NO. 39	REPORT NO. WTS-1018-019
MISSILE MODEL WS-100A	DCN H	REPORTED BY JH & TV	PAGE NO.
CONFIGURATION	ADCN 23	CHECKED BY CB	DATE 6/10/63



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	25.85	6.15		19.70	RC	68.40	23.40		45.00
RH	79.55	41.00		38.55	RD	80.25	59.55		20.70
RE	130.10	75.50		54.60	RA	76.70	39.50		37.20
RG	69.95	42.35		27.60	RB	80.10	42.55		37.55
TOTAL	305.45	165.00		140.45	TOTAL	305.45	165.00		140.45

DIMENSIONAL DATA

REACTION	INCHES	DM.	INCHES	DM.	INCHES
AF	42.007	EA	84.510	GB	77.478
AH	42.023	EB	84.505	GD	77.481
BE	62.996	FC	115.490	JA	115.500
BG	62.999	FD	115.495	JC	115.500
C	50.000	H	100.000	M	100.000
D	60.000				

LONGITUDINAL C.G.

REACTION	NET WT.	ARM	MOMENT
RF	19.70	42.007	
RH	38.55	42.023	
RE	54.60	62.996	
RG	27.60	62.999	
AS WGD	140.45	54.30	7,625.9

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	37.20	84.510	
RB	37.55	84.505	
RC	45.00	115.490	
RD	20.70	115.495	
AS WGD	140.45	99.00	13,904.7

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	37.55	77.478	
RD	20.70	77.481	
RA	37.20	115.500	
RC	45.00	115.500	
AS WGD	140.45	99.73	14,007.3

(RR) = Rear Reaction

SERIAL NUMBER: 0000019

CHECK LIST NO. 39		MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)									
DATE		MODEL	WS-139A	FINAL ASSEMBLY DRAWING NO. 25-25402			Mo	Day	Yr				
		SECTION	39	MISSILE NO.			COMPONENT						
		MISSILE COMPONENT CTLI		COMPONENT PART NO. Noted									
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	REMOTE SITE SHIPMENT	REMOTE SITE	AS WEIGHED	REMOTE SITE	LAUNCH
39	Instrumentation Group-Trainer Test	25-25402					-						
39a	CTLI Structure Assy.	25-25403-11					-						
	Support Structure	25-29094-45					x	x					
	Primary Structure	25-29095-15					x	x					
	Insulation & External Markings	25-29095-3					x	x					
	Antenna & Spacer	25-29096-3					x	x					
	Plate-Identification	21-51600-329					x	x					
39b	Cable & Equipment Installation	25-25404-12					-						
	Battery, Squib	10-20942-2					x	x					
	Battery, Squib	10-20942-1					x	x					
	Cable Set SE-35A	55008-106					-						
	Cable	AN31277-315					x	x					
	Cable	AN31278-315					x	o					
	Cable	AN31279-315					x	o					
39c	Kit Installation (ECP 525)	25-25402-21					x	x					
39d	Kit Installation (ECP 551)	25-25402-26					x	x					
39e	Kit Installation (ECP 578)	25-25402-34					x	x					

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5.4.3 WEIGHT AND BALANCE CHANGE RECORD									
ASSOCIATE CONTRACTOR		PORTING		CONTRACT NO.		REPORT NO.		WTS-1018-019	
COMPONENT		SECTION 39		LOT NO.		DATE		6/10/63	
MODEL NO.		MS-139A		DRAWING NO.		PREPARED		JH/TV	
SERIAL NO.		0000019		U.O. MISSILE		APPROVED		GO	
EQUIPMENT CHANGE RECORD				WEIGHT AND BALANCE					
LINE	PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS	
				ARM	MOMENT	ARM	MOMENT	ARM	MOMENT
1	225-25402-35	Instr. Group Trainer (As Weighed)	140.45	54.30	7,625.9	99.00	13,904.7	99.73	14,007.3
2									
3									
4									
5									
6		ADD:							
7	7A131278-315	Cable-Autonetics	3.84	74.2		115.5		102.8	
8	8A131279-315	Cable-Autonetics	2.11	50.4		106.9		111.4	
9									
10									
11									
12	12P5-25402-35	Instr. Group Trainer (Complete)	146.40	54.76	8,017.2	99.55	14,573.8	99.98	14,637.1
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									

## 5.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION  
APPLICABLE TO CTLI SECTION S/N 0000019 AND INSTALLATION KIT

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 15 April 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
506	CTLI Raceway Cover Revision	1	- .2	Yes
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

CTLI SECTION, S/N 0000020

6.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted jet changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries check lists, and ECP lists applicable to this installation. Page 53 summarizes the complete installation mass properties and consists of data from page 54 (average mass properties of downstage components), page 55 (predicted sealant changes), and page 59 (actual weight of CTLI section S/N 0000020). In addition, page 56 presents summary check lists by production section as backup data for page 57. Page 60 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NEFD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

6.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000020						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> ×10 <sup>-3</sup>	
						LONG. *	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			151.6	54.8	99.8	100.2	.004	.002
5			Silo							
6			Aero							
7	42	G&C Section			7.4	66.8	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			16.1	81.9	108.3	117.2	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			21.1	68.6	111.6	120.2	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.3	112.6	121.4	0	.008
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.4	55.6	112.2	120.6	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.4		55.6	112.2	120.6		
37	47	Interstage 1-2			25.7	73.9	114.8	125.2	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			30.8	111.0	117.7	130.0	0	.027
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.6	74.7	119.3	128.6	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			284.0					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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6.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG. *	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	55.9	107.5	110.6		
5			Silo							
6			Aero							
7	42	G&C Section			6.96	66.9	112.0	114.3		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			15.94	81.9	108.3	117.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.88	57.7	110.3	117.8		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.88		57.7	110.3	117.8		
22	45	Interstage 2-3			20.94	68.4	111.7	120.4		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.3	112.6	121.4		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.41	55.6	112.2	120.6		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.41		55.6	112.2	120.6		
37	47	Interstage 1-2			25.21	73.5	115.1	125.6		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			29.98	109.7	117.7	130.1		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.43	74.1	119.3	128.5		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.29					
49			Silo							
50			Aero							
51			Base							
52			Jett							

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6.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**						REPORT NO. _____		DATE _____		
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			.2	53.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3			.2	85.0	103.0	101.8		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			0	-	-	-		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett							
37	47	Interstage 1-2			.5	94.7	102.0	103.4		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\*\* Reference D2-13954-534  
2-5550-0-58 \* Boeing Section Stations  
NAV. SYM. B (See Missile Station  
Diagram)

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6.4.1

U/O MISSILE 0000020

MISSILE MODEL W3-139A

CONFIGURATION

DRAWING NO. 27-2702-35

DCN

ADGN

CHECK LIST NO. 39

REPORTED BY CP/CH

CHECKED BY GO

REPORT NO.

PAGE NO.

DATE 5/27/63

ACTUAL WEIGHT RECORD - CTLI SECTION

LONGITUDINAL REFERENCE DATUM

LATERAL REFERENCE DATUM

VERTICAL REFERENCE DATUM

WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	19.25	5.30		13.95	RC	98.55	52.90		45.65
RH	85.50	41.80		44.70	RD	50.50	30.20		20.30
RE	137.80	76.65		61.15	RA	46.65	10.05		36.60
RG	62.60	41.35		21.25	RB	110.40	71.90		38.50
TOTAL	396.15	165.10		141.05	TOTAL	306.10	165.05		141.05

DIMENSIONAL DATA

DIM.	INCHES	DIM.	INCHES	DIM.	INCHES
AF	42.007	EA	84.510	GB	77.478
AH	42.023	EB	84.505	GD	77.481
BE	62.996	FC	115.490	JA	115.500
BG	62.999	FD	115.495	JC	115.500
C	50.000	H	100.000	M	100.000
D	60.000				

LONGITUDINAL C.G.

REACTION	NET WT.	ARM	MOMENT
RF	13.95	42.007	
RH	44.70	42.023	
RE	61.15	62.996	
RG	21.25	62.999	
AS WGD	141.05	54.10	7,655.4

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	36.60	84.510	
RB	38.50	84.505	
RC	45.65	115.490	
RD	20.30	115.495	
AS WGD	141.05	98.99	13,963.2

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	38.50	77.478	
RD	20.30	77.481	
RA	36.60	115.500	
RC	45.65	115.500	
AS WGD	141.05	99.65	14,055.6

(RR) = Rear Reaction

SERIAL NUMBER: 0000000

CHECK LIST NO. 39		6.4.2 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)				
DATE		MODEL	WS-133A	FINAL ASSEMBLY DRAWING NO.	25-25402-35	Mo	Day	Yr
		SECTION	39	MISSILE NO.				
		MISSILE COMPONENT	CTLI	COMPONENT PART NO. Noted				
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED
39	Instrumentation Group-Trainer Test	25-25402-35					-	
39a	CTLI Structure Assy.	25-25403-11					-	
	Support Structure	25-29094-45					x	x
	Primary Structure	25-29093-15					x	x
	Insulation & External Markings	25-29095-3					x	x
	Antenna & Spacer	25-29096-3					x	x
	Plate-Identification	21-51600-329					x	y
39b	Cable & Equipment Installation	25-25404-12					-	
	Battery, Squib	10-20942-2					x	x
	Battery, Squib	10-20942-1					x	x
	Cable Set SE-35A	55008-106					-	
	Cable	AN31277-315					x	x
	Cable	AN31278-315					x	o
	Cable	AN31279-315					x	o
39c	Kit Installation (ECP 525)	25-25402-21					x	x
39d	Kit Installation (ECP 551)	25-25402-26					x	x
39e	Kit Installation (ECP 578)	25-25402-34					x	x

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6.4.3 WEIGHT AND BALANCE CHANGE RECORD									
ASSOCIATE CONTRACTOR		BOEING		CONTRACT NO.		AF04(647)-289		REPORT NO.	
COMPONENT		SECTION 59		LOT NO.				DATE	
MODEL NO.		WS-133A		DRAWING NO.		25-25402-35		PREPARED	
SERIAL NO.		0000020		U.O. MISSILE				APPROVED	
								GO	
LINE	PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS ARM	X AXIS MOMENT	Y AXIS ARM	Y AXIS MOMENT	Z AXIS ARM	Z AXIS MOMENT
1	225-25402-35	Instr. Group Trainer (As Weighed)	141.05	54.10	7,655.4	98.99	13,963.2	99.65	14,055.6
2									
3									
4									
5									
6		ADD:							
7	7A/N31278-315	Cable - Autonetics	3.85	74.2		115.5		102.8	
8	81/N31279-315	Cable - Autonetics	2.12	50.1		106.9		111.4	
9									
10									
11									
12	1225-25402-35	Instr. Group Trainer (Complete)	147.02	54.74	8,047.9	99.54	14,634.5	99.90	14,687.5
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									



## 6.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION  
APPLICABLE TO CTLI SECTION S/N 0000020 AND INSTALLATION KIT

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 15 April 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
506	CTLI Raceway Cover Revision	1	- .2	Yes
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

CTLI SECTION, S/N 0000021

7.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries check list, and ECP lists applicable to this installation. Page 62 summarizes the complete installation mass properties and consists of data from page 63 (average mass properties of downstage components), page 64 (predicted sealant changes), and page 68 (actual weight of CTLI section S/N 0000021). In addition, page 65 presents summary check lists by production section as backup data for page 63. Page 69 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-IMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

7.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000021						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> ×10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			150.1	54.8	99.8	100.3	.004	.002
5			Silo							
6			Aero							
7	42	G&C Section			7.4	66.8	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			16.1	81.9	108.3	117.2	0	.001
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			21.1	68.6	111.6	120.2	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.3	112.6	121.4	0	.008
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.4	55.6	112.2	120.6	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.4		55.6	112.2	120.6		
37	47	Interstage 1-2			25.7	73.9	114.8	125.2	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			32.8	111.0	117.7	130.0	0	.027
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			2.6	74.7	119.3	128.6	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			283.4					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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7.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	55.9	107.5	110.6		
5			Silo							
6			Aero							
7	42	G&C Section			6.96	66.9	112.0	114.3		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			15.94	81.9	108.3	117.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.68	57.7	110.3	117.8		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.88		57.7	110.3	117.8		
22	45	Interstage 2-3			20.94	66.4	111.7	120.4		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.3	112.6	121.4		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.41	55.6	112.2	120.6		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.41		55.6	112.2	120.6		
37	47	Interstage 1-2			25.21	73.5	115.1	125.6		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			29.96	109.7	117.7	130.1		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.43	70.1	119.3	128.5		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.29					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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7.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			.2	53.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3			.2	85.0	103.0	101.8		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			0	-	-	-		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2			.5	94.7	102.0	103.4		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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\*\* Reference D2-13954-

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**ACTUAL WEIGHT RECORD - CTLI SECTION**

2-5550-0-53 R1

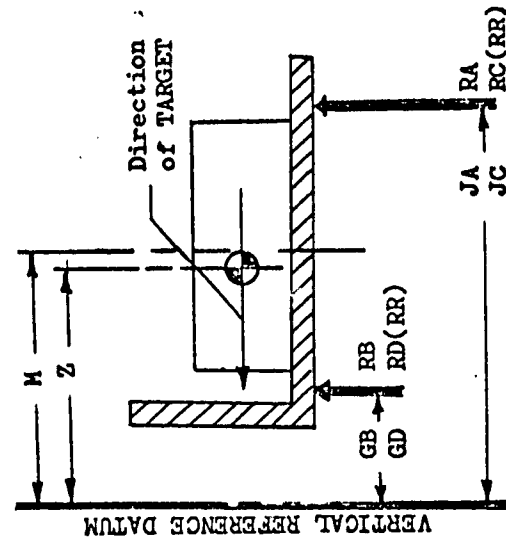
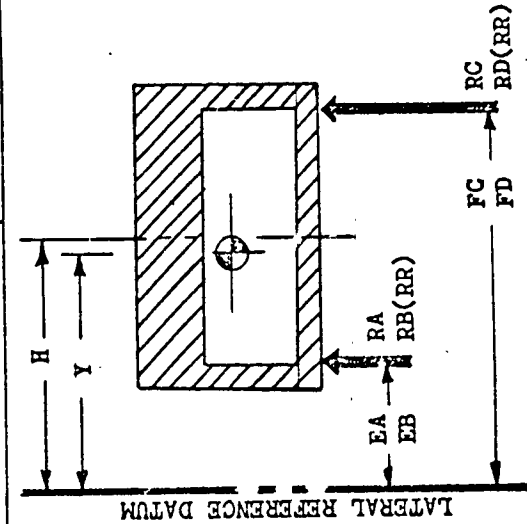
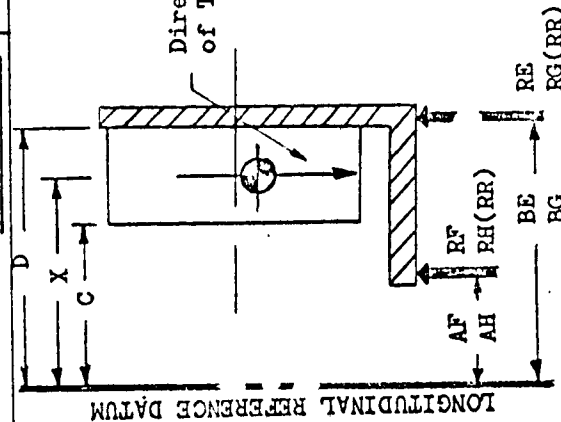
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REPORT NO. WTS-1019-021  
PAGE NO. \_\_\_\_\_  
DATE 6/11/63

CHECK LIST NO. 39  
REPORTED BY JH/TT  
CHECKED BY CB

DRAWING NO. 25-25402-35  
DCN • H  
ADCN 02

U/O MISSILE 0000021  
MISSILE MODEL MS-12



		WEIGHING DATA			
		BG		RG(RR)	
REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION
RF	88.25	40.45		47.80	RC
RH	16.80	6.50		10.30	RD
RE	68.20	41.56		26.65	RA
RG	131.45	76.55		54.90	R3
TOTAL	304.70	165.05		139.65	TOTAL

TUNG DATA				
REACTION	GR. WT.	TARE	CORR.	NET WT.
RC	77.80	36.05		41.75
RD	70.40	47.00		23.40
RA	66.70	26.85		39.85
R3	89.80	55.15		34.65
TOTAL	304.70	165.05		139.65

DIMENSIONAL DATA					
DIM.	INCHES	DIM.	INCHES	DIM.	INCHES
AF	42.007	EA	84.510	GB	77.478
AH	42.023	EB	84.505	GD	77.481
BE	62.996	FC	115.490	JA	115.500
BG	62.999	FD	115.495	JC	115.500
C	50.000	H	100.000	M	100.000
D	60.000				

LONGITUDINAL C.G.			
REACTION	NET WT.	ARM	MOMENT
RF	47.80	42.007	
RH	10.30	42.023	
RE	26.65	62.996	
RG	54.90	62.999	
AS WGD	139.65	54.27	7,578.3

LATERAL C.G.		
REACTION	NET WT.	ARM
RA	39.85	84.510
RB	34.65	84.505
RC	41.75	115.490
RD	23.40	115.495
AS WGD	139.65	98.96
		13,820.1

VERTICAL C.G.		
REACTION	NET WT.	MOMENT
RB	34.65	77.478
RD	23.40	77.481
RA	39.85	115.500
RC	41.75	115.500
AS WGD	139.65	99.70
		13,922.5

SERIAL NUMBER: 0000021

CHECK LIST NO. 39		7.4.2 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)			
DATE		MODEL WS-133A		FINAL ASSEMBLY DRAWING NO. 25-25402		Mo Day Yr	
		SECTION 39		MISSILE NO.		COMPONENT	
ITEM NUMBER		MISSILE COMPONENT CTLI		COMPONENT PART NO. Noted		LAUNCH	
DESCRIPTION		PART NO.		WEIGHT		X ARM Y ARM Z ARM	
39	Instrumentation Group-Trainer Test	25-25402					
39a	CTLI Structure Assy.	25-25403-11					
	Support Structure	25-29094-45					
	Primary Structure	25-29093-15					
	Insulation & External Markings	25-29095-3					
	Antenna & Spacer	25-29096-3					
	Plate-Identification	21-51600-329					
39b	Cable & Equipment Installation	25-25404-12					
	Battery, Squib	10-20942-2					
	Battery, Squib	10-20942-1					
	Cable Set SE-35A	55008-106					
	Cable	AN31277-315					
	Cable	AN31278-315					
	Cable	AN31279-315					
39c	Kit Installation (ECP 525)	25-25402-21					
39d	Kit Installation (ECP 551)	25-25402-26					
39e	Kit Installation (ECP 578)	25-25402-34					

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WEIGHT AND BALANCE CHANGE RECORD													
7.4.3													
ASSOCIATE CONTRACTOR		EQUIPMENT		CONTRACT NO.		REPORT NO.							
COMPONENT		SECTION 39		LOT NO.		DATE							
MODEL NO.		WS-133		DRAWING NO.		PREPARED							
SERIAL NO.		0000021		U.O. MISSILE		APPROVED							
LINE		EQUIPMENT CHANGE RECORD		WEIGHT AND BALANCE									
PART NO.		DESCRIPTION OF EQUIPMENT		WEIGHT		X AXIS		Y AXIS		Z AXIS			
						ARM		MOMENT		ARM		MOMENT	
1	2-25-25402-35	Instr. Group Trainer (As Weighed)	139.65	54.27	7,578.3	98.96	13,620.1	99.70	13,922.5				
2													
3													
4													
5		ADD:											
6	AN31278-315	Cable-Autonetics	3.77	74.2		115.5		102.8					
7	AN31279-315	Cable-Autonetics	2.12	59.4		106.9		111.4					
8													
9													
10													
11	25-25402-35	Instr. Group Trainer (Complete)	145.55	54.73	7,965.4	99.51	14,483.2	99.94	14,546.7				
12													
13													
14													
15													
16													
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32													



7.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION  
APPLICABLE TO CTLI SECTION S/W 0000021 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 15 April 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+.5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of C&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
506	CTLI Raceway Cover Revision	1	-.2	Yes
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

FOR ERRATA

AD 404314

THE FOLLOWING PAGES ARE CHANGES

TO BASIC DOCUMENT

# ACTIVE PAGE RECORD

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	2	E	2.1	E								50	B				
	3	E										51	B				
	4	B	4.1	E	4.2	E						52	B				
	5											53	B				
	6	E										54	B				
	7											55	B				
	8											56	B				
	9											57	B				
	10											58	B				
	11											59	B				
	12											60	B				
	13											61	B				
	14											62	B				
	15											63	B				
	16											64	B				
	17											65	B				
	18											66	E				
	19											67	B				
	20											68	B				
	21											69	B				
	22											70	C				
	23											71	C				
	24											72	C				
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			27	A								75	C				
			28	A								76	C				
			29	A								77	C				
			30	A								78	C				
			31	A								79	C				
			32	A								80	C				
			33	A								81	C				
			34	A								82	C				
			35	A								83	C				
			36	A								84	C				
			37	A								85	C				
			38	A								86	C				
			39	A								87	E				
			40	A								88	E				
			41	A								89	E				
			42	A								90	E				
			43	B								91	E				
			44	B								92	E				
			45	B								93	E				
			46	B								94	E				
			47	B								95	E				
			48	B								96	E				

FROM: ME

TO:

404314

US GPO: 1965 O-700-0

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NO. 10-1-104-1-1

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			97	E							145	E			
			98	E							146	E			
			99	E							147	E			
			100	E							148	E			
			101	E							149	E			
			102	E							150	E			
			103	E	103.1	E					151	E			
			104	E							152	E			
			105	E							153	E			
			106	E							154	E			
			107	E							155	E			
			108	E							156	E			
			109	E							157	E			
			110	E											
			111	E											
			112	E	112.1	E									
			113	E											
			114	E											
			115	E											
			116	E											
			117	E											
			118	E											
			119	E											
			120	E											
			121	E											
			122	E											
			123	E											
			124	E											
			125	E											
			126	E											
			127	E											
			128	E											
			129	E											
			130	E	130.1	E									
			131	E											
			132	E											
			133	E											
			134	E											
			135	E											
			136	E											
			137	E											
			138	E											
			139	E	139.1	E									
			140	E											
			141	E											
			142	E											
			143	E											
			144	E											

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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
A	<p>Revised pages 1, 4, 10.</p> <p>Added pages 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42.</p> <p>Added Moments of Inertia to page 10.</p> <p>Added Sections 3.0 and 4.0 to the document.</p>	5-17-63	D. Brenden <i>D. Brenden</i>
B	Added Sections 5.0, 6.0 and 7.0 to the document.	6-17-63	D. Brenden <i>D. Brenden</i>
C	Added Sections 8.0 and 9.0 to the document.	7-17-63	D. Brenden <i>D. Brenden</i>
D	<p>Revised pages 2, 3, 4.1</p> <p>Added pages 2.1, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112.</p>	8-16-63	D. Brenden <i>D. Brenden</i>
E	<p>Revised pages 2, 2.1, 3, 4.1, 6, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112.</p> <p>Added pages 4.2, 103.1, 112.1, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 130.1, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 139.1</p>	10-23-63	D. Brenden <i>D. Brenden</i>

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2-8142-2

REV SYM E

~~SECRET~~ NO. 22-13943-1

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1.0 INTRODUCTION

1.1 REFERENCES

- 1.1.1 BSD Exhibit 62-45, "Mass Properties Control Data for WS-133A", dated 3 August 1962.
- 1.1.2 Supplemental Agreement No. 6 to Contract AF04(694)-46.
- 1.1.3 Boeing Document D2-13943, "Flight Article Mass Properties Report for CTLI Installations for MRCN 6301 S/N 0000001 - 0000015."
- 1.1.4 Boeing Document D2-13944-501, "Flight Article Mass Properties Report for Missile 501 Components."
- 1.1.5 Boeing Document D2-13945-xxx, "Air Force Plant 77 Flight Article Mass Properties Report for Missile xxx."
- 1.1.6 Boeing Document D2-13954-xxx, "Vandenberg Air Force Base Flight Article Mass Properties Report for CTL Missile xxx."
- 1.1.7 Boeing Document D2-13957-x, "Statistical Means and Dispersions for the Mass Properties of Boeing Components for the Wing I Operational Minuteman Missile."

1.2 DISCUSSION

This weight report for a series of CTLI Installations for Wing I Minuteman missiles is presented in accordance with section 3.1.1 of BSD Exhibit 62-45 (reference 1.1.1) as authorized by CCN 258 to AF04(647)-580 (reference 1.1.2). This report presents summary mass properties data for all CTLI components to be installed at VAFB including kit weights supplied by other Associate Contractors. It does not include data for CTLI provisions which are incorporated into every production missile (the CTLI "weight penalty") or data remaining unchanged after the original assembly of the missile at Air Force Plant 77. The following pages, therefore, list only the items to be added or changed in the course of the conversion and the mass properties data given on check lists or weight and balance summaries are net changes which must be combined with the appropriate missile data from Plant 77 (reference 1.1.5) and Vandenberg Air Force Base (reference 1.1.6) in order to obtain the mass properties of the complete missile.

Each section of this report will contain one complete CTLI installation data package consisting of (1) a brief discussion of the data, (2) sectional distribution of CTLI components, (3) check lists and change records as required, and (4) a list of Engineering Change Proposals incorporated on the components. Average weights will be used for all components other than the CTLI section which will be an actual weight. Background data for these average weights can be found in reference 1.1.7. Refer to reference 1.1.3 for data covering the installation of CTLI sections from S/N 0000001 through S/N 0000015.

CTLI SECTION, S/N 0000027

10.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTLI missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 89 summarizes the complete installation mass properties and consists of data from page 90 (average mass properties of downstage components), page 91 (predicted sealant changes), and page 102 (actual weight of CTLI section S/N 0000027). In addition, page 92 presents summary check lists by production section as backup data for page 90. Page 103 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

10.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000027						REPORT NO. _____ DATE _____				
LINE	QTY	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG. #	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			149.5	54.7	99.7	100.2	.004	.003
5			Silo							
6			Aero							
7	42	2nd Stage Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.9	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			19.45	65.1	111.7	120.1	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.45	55.4	112.1	120.5	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.45		55.4	112.1	120.5		
37	47	Interstage 1-2			26.0	74.1	114.8	125.2	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			283.2					
49			Silo							
50			Aero							
51			Base							
52			Jett							

2-5950 0-58 \* Boeing Section Stations (See Missile Station Diagram)

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10.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
LINE	SS	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG. W	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	56.0	107.5	110.7	0	0
5			Silo							
6			Aero							
7	42	G&C Section			6.94	67.5	112.0	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.65	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	- 1.90		57.7	110.3	117.8		
22	45	Interstage 2-3 (Aft)			19.25	64.9	111.8	120.3	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett	- 1.45		55.4	112.2	120.6		
37	47	Interstage 1-2 (Aft)			25.46	73.7	115.0	125.6	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.73	74.0	119.5	128.3	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.63					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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10.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**						REPORT NO. _____				
						DATE _____				
LINE	STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x 10 <sup>-3</sup>	
						LONG*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	O&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			.2	53.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3			.2	85.0	103.0	101.8		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			0	-	-	-		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett							
37	47	Interstage 1-2			.5	94.7	102.0	103.4		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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REV. SYM. E \*\* Reference D2-13954-534

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CHECK LIST NO.		10.3.3 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)		
DATE		MODEL		Mo	Day	
		FINAL ASSEMBLY DRAWING NO. 21-52900-20		Yr		
SECTION 44	MISSILE NO.					
MISSILE COMPONENT 3rd STAGE MOTOR	COMPONENT PART NO.					
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM
4a	Cable Assy. Set - Electrical	25-26878-5	6.47	92.9	111.2	118.4
4b	Conduit Supt. Set - Raceway	25-29239-18	15.68	85.5	110.5	117.9
4c	Instl. Kit - Trainer Test Group	25-21677-17	1.49	80.2	110.7	118.2
4d	INS 5-62 Installed at VAFB		*			
The following items are furnished by Aerojet						
4e	Destruct System, AODE	359764	4.03	58.1	99.8	114.0
The following items are deleted from the missile assembly in order to accommodate the CRT Installation						
4f	Recovery Instl.	25-23214-5	9.93	80.2	110.2	117.6
4g	Standards Instl.	25-30133-1	.09	68.5	109.4	116.2
4h	INS 5-62 Removed at VAFB		*			

\* See page 12 for a summary of the net weight and balance change of INS 5-62 at VAFB

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\* See pages 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

CHECK LIST NO.		10.3.5 MISSILE WEIGHING CHECK LIST										RECORD OF CHECKING (DATE)							
DATE		MODEL		FINAL ASSEMBLY DRAWING NO. 21-52900-20										Mo Day Yr					
SECTION 46		MISSILE NO.										COMPONENT				MISSILE			
MISSILE COMPONENT 2nd STAGE MOTOR		COMPONENT PART NO.										WEIGHED				RECEIVED			
DESCRIPTION		PART NO.		WEIGHT		X ARM		Y ARM		Z ARM		BASIC WEIGHT				SHIPMENT			
ITEM NUMBER																			
6a	Cable Assy. Set - Electrical	25-26878-5	10.75	111.1	112.8	121.2													
6b	Conduit Supt. Set - Raceway	25-29239-18	21.93	109.2	112.2	121.2													
6c	Instl. Kit - Trainer Test Group	25-31677-17	2.05	90.4	111.7	120.3													
6d	Timer - Interval	29-22327-2	1.25	67.1	112.5	121.8													
6e	Battery - Squib Activated	10-20942-3	1.40	63.9	112.5	121.8													
6f	BMS 5-62 Installed at VAFB		*																
The following items are furnished by Aerojet																			
6g	Destruct System, AODS	359764	4.19	74.8	111.8	120.4													
The following items are deleted from the missile assembly in order to accommodate the CMI Installation																			
6h	Raceway Instl.	25-23214-5	15.84	103.1	111.9	120.7													
6i	BMS 5-62 Removed At VAFB		*																

\* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

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CHECK LIST NO.		10.3.6 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)										
DATE		MODEL		Mo Day Yr										
		FINAL ASSEMBLY DRAWING NO. 21-52900-20												
SECTION 47		MISSILE NO.		COMPONENT										
MISSILE COMPONENT 1-2 INTERSTAGE		COMPONENT PART NO.		MISSILE										
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	REMOTE SITE SHIPMENT	AS RECEIVED	REMOTE SITE	AS WEIGHED	REMOTE SITE	LAUNCH
7a	Cable Assy. Set - Electrical	25-26878-5	5.48	71.2	115.8	126.4								
7b	Conduit Supt. Set - Raceway	25-29239-18	23.03	78.9	115.0	125.9								
7c	Instl. Kit - Trainer Test Group	25-31677-17	1.32	87.4	115.3	125.9								
7d	MSB 5-62 Installed at VAFB		*											
The following items are deleted from the missile assembled in order to accommodate the GYUJ Installation														
7e	Standard's Instl.	25-30133-3	.10	99.8	115.8	126.0								
7f	Raceway Instl.	25-23214-5	5.72	89.7	114.8	126.4								
7g	MSB 5-62 Removed at VAFB		*											

CHECK LIST NO.		MISSILE WEIGHING CHECK LIST										RECORD OF CHECKING (DATE)			
DATE		MODEL		PLANS AND DRAWING NO. 21-52900-20								7/6	7/7	7/8	7/9
ITEM NUMBER	SECTION	48	MISSILE NO.	DRAWING PART NO.	25-26878-5	25-29239-18	25-30677-17	29-22327-1	10-20942-3	359764	6.19	18.1	116.9	129.3	MISSILE
8a	Cable Assy. Set - Electrical														
8b	Conduit Supt. Set														
8c	Instl. Kit - Trainer Test														
8d	Timer - Interval														
8e	Battery - Squib Activated														
8f	BMS 5-62 Instl. at VAFB														
The following items are furnished by Aerojet															
8g	Destruct System, AODS														
The following items are deleted from the missile assembly in order to accommodate the CMI Installation															
8h	Recovery Instl.														
8i	BMS 5-62 Removed at VAFB														

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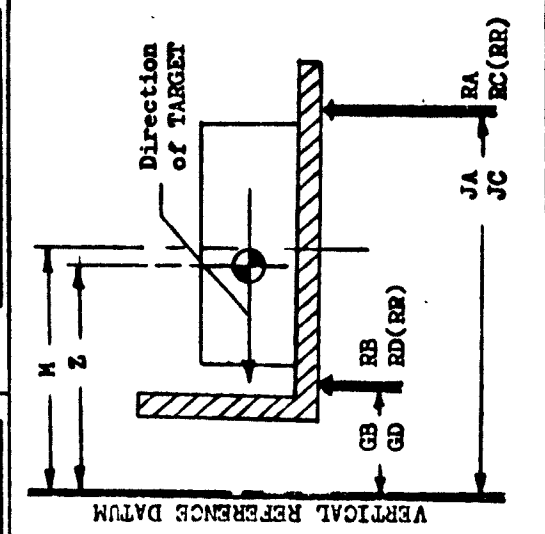
\* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB



10.4.1

CHECK LIST NO. 39  
REPORTED BY CB/RH  
CHECKED BY RH

REPORT NO. WTS-1109-027  
PAGE NO.  
DATE 10/21/63



LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	31.85	42.007		RA	51.50	84.510		RB	23.05	77.478	
RH	26.70	48.023		RB	23.05	84.505		RD	35.40	77.481	
RE	42.15	62.996		RC	30.20	115.490		EA	51.50	115.500	
RG	39.25	62.999		RD	35.40	115.495		EC	30.20	115.500	
AS WGD	140.15	54.23	7,600.5	AS WGD	140.15	99.01	13,876.4	AS WGD	140.15	99.64	13,965.0

**(RR) = Rear Reaction**

SERIAL NUMBER: 0000027

CHECK LIST NO.		10.4.2		MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)			
DATE		MODEL WS-133		FINAL ASSEMBLY DRAWING NO. 25-25402-36		Mo	Day	Yr	
						10	21	63	
ITEM NUMBER	SECTION	39	MISSILE NO.			COMPONENT			
MISSILE COMPONENT		CTUI	COMPONENT PART NO.	Noted		MISSILE			
DESCRIPTION		PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	REMOTE SITE SHIPMENT
39	Instrumentation Group-Trainer Test	25-25402-36							LAUNCH
39a	CTUI Structure Assy.	25-25403-11							REMOTE SITE
	Support Structure	25-29094-45							AS WEIGHED
	Primary Structure	25-29093-15							REMOTE SITE
	Insulation & External Markings	25-29095-3							AS RECEIVED
	Antenna & Spacer	25-29096-3							REMOTE SITE
	Flash Identification	21-51600-329							SHIPMENT
39b	Cable & Equipment Installation	25-25404-16							
	Battery, Equip	10-20942-2							
	Battery, Equip	10-2094204							
	Cable Set SR-35B	55018-106							
	Cable	AN37192-315							
	Cable	AN37194-315							
	Cable	AN37196-315							

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10.4.3										WEIGHT AND BALANCE CHANGE RECORD																			
ASSOCIATE CONTRACTOR					BOEING					CONTRACT NO.					AF04(647)-289					REPORT NO.					WTS-1109-027				
COMPONENT					SECTION 49					LOT NO.										DATE					10/21/63				
MODEL NO.					WS-133A					DRAWING NO.					25-25402-36					PREPARED					CB/HH				
SERIAL NO.					0000027					U.O. MISSILE										APPROVED					OO				
EQUIPMENT CHANGE RECORD										WEIGHT AND BALANCE																			
PART NO.		DESCRIPTION OF EQUIPMENT			WEIGHT		X AXIS		Y AXIS		Z AXIS																		
					ARM		MOMENT		ARM		MOMENT																		
1	225-25402-36	Instr. Group Trainer (As Weighed)			140.15	54.23	7,600.5	99.01	13,876.4	99.64	13,965.0																		
2																													
3																													
4																													
5		ADD:																											
6	37194-315	Cable-Autonetics			3.35	74.2		115.5		102.8																			
7	37196-315	Cable-Autonetics			1.36	50.4		106.9		111.4																			
8																													
9																													
10	225-25402-36	Instr. Group Trainer (Complete)			144.86	54.66	7,917.6	99.47	14,408.7	99.83	14,460.9																		
11																													
12																													
13																													
14																													
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10.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION  
APPLICABLE TO CTLI SECTION S/N 0000027 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 540	Putting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

10.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION  
APPLICABLE TO CTLI SECTION S/N 0000027 AND INSTALLATION KIT**

(Cont.)

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
62-	Addition of Static Dissipators in 47 Section and 1st Stage Skirt	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmer	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 0000028

- 11.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 105 summarizes the complete installation mass properties and consists of data from page 106 (average mass properties of downstage components), page 107 (predicted sealant changes), and page 111 (actual weight of CTLI section S/N 0000035). In addition, page 108 presents summary check lists by production section as backup data for page 106. Page 112 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

11.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000028						REPORT NO. _____ DATE _____				
ITEM NO.	REV.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	1	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			149.1	54.7	99.7	100.1	.004	.003
5			Silo							
6			Aero							
7	42	G&G Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.9	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18		Jettisoned Portion	Silo							
19			Aero							
20			Base							
21			Jett.	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3 (Aft)			19.45	65.1	111.7	120.1		
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33		Jettisoned Portion	Silo							
34			Aero							
35			Base							
36			Jett.	- 1.45		55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			26.0	74.1	114.8	125.2	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	5.1st			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			282.8					
49			Silo							
50			Aero							
51			Base							
52			Jett.							

\* Boeing Section Stations (See Missile Station Diagram)

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11.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
LINE NO.	REV.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> X10 <sup>-3</sup>	
						LONG. #	LAT.	VERT.	ROLL	PITCH
1	41	KV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	56.0	107.5	110.7	0	0
5			Silo							
6			Aero							
7	42	G&C Section			6.94	67.5	112.0	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.65	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.90		57.7	110.3	117.8		
22	45	Interstage 2-3 (Aft)			19.25	64.9	111.8	120.3	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.45		55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			25.46	73.7	115.0	125.6	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.73	74.0	119.5	128.3	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.63					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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11.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**						REPORT NO. _____ DATE _____				
23 24 25	26 27 28	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2		Silo								
3		Aero								
4	39	CTLI Section			.2	54.5	111.5	111.5		
5		Silo								
6		Aero								
7	42	G&C Section			.4	65.4	110.5	113.5		
8		Silo								
9		Aero								
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11		Silo								
12		Aero								
13		Base								
14	45	Interstage 2-3 (Fwd)			.2	53.6	110.8	116.7		
15		Silo								
16		Aero								
17		Base								
18		Silo								
19		Jettisoned	{							
20		Portion								
21		Jett		.2		53.6	110.8	116.7		
22	45	Interstage 2-3 (Aft)			.2	85.0	103.0	101.8		
23		Silo								
24		Aero								
25	46	2nd Stage Engine			0	-	-	-		
26		Silo								
27		Aero								
28		Base								
29	47	Interstage 1-2 (Fwd)			0	-	-	-		
30		Silo								
31		Aero								
32		Base								
33		Silo								
34		Jettisoned	{							
35		Portion								
36		Jett		.5						
37	47	Interstage 1-2 (Aft)			.5	94.7	102.0	103.4		
38		Silo								
39		Aero								
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41		Silo								
42		Aero								
43		Base								
44	49	5.1rt			.2	101.3	119.2	133.9		
45		Silo								
46		Aero								
47		Base								
48		MISSILE			2.7					
49		Silo								
50		Aero								
51		Base								
52		Jett								

\* Boeing Section Stations (See Missile Station Diagram)

REV. SYM. E \*\* Reference D2-13954-534

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**FOUND ON PAGES 92 THROUGH 99.**

11.4.1

U/O MISSILE 0000028

MISSILE MODEL WS-133A

CONFIGURATION

DRAWING NO. 25-25402-36

DCN

ADCN

CHECK LIST NO. 39

REPORTED BY CB/RR

CHECKED BY EW

REPORT NO. WTS-1108-208

PAGE NO.

DATE 10/18/63

ACTUAL WEIGHT RECORD - CTLI SECTION

LONGITUDINAL REFERENCE DATUM

LATERAL REFERENCE DATUM

VERTICAL REFERENCE DATUM

WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	43.85	12.65		31.20
RH	66.90	39.70		27.20
RE	116.95	74.45		42.50
RG	88.50	49.60		38.90
TOTAL	316.20	176.40		139.80

LONGITUDINAL C.G.

REACTION	NET WT.	ARM	MOMENT
RF	31.20	42.007	
RH	27.20	42.023	
RE	42.50	62.996	
RG	38.90	62.999	
AS WGD	139.80	54.23	7,581.6

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	45.30	84.510	
RB	29.30	84.505	
RC	36.00	115.490	
RD	29.20	115.495	
AS WGD	139.80	98.96	13,834.4

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	29.30	77.478	
RD	29.20	77.481	
RA	45.30	115.500	
RC	36.00	115.500	
AS WGD	139.80	99.59	13,922.7

DIMENSIONAL DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.
EA	42.007			42.007
EB	42.023			42.023
FC	62.996			62.996
FD	62.999			62.999
H	50.000			50.000
M	60.000			60.000

(RR) = Rear Reaction

CHECK LIST NO.		11.4.2		MISSILE WEIGHING CHECK LIST						RECORD OF CHECKING (DATE)						
		MODEL WS-13A		FINAL ASSEMBLY DRAWING NO. 25-25402-36						Mo 10 Day 18 Yr 63						
DATE		SECTION 39		MISSILE NO. _____						COMPONENT MISSILE						
		MISSILE COMPONENT CMLI		COMPONENT PART NO. _____ Noted												
ITEM NUMBER		DESCRIPTION		PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	REMOTE SITE SHIPMENT	AS RECEIVED REMOTE SITE	AS WEIGHED REMOTE SITE	LAUNCH			
39		Instrumentation Group-Trainer Test		25-25402-36					-							
39a		CMLI Structure Assy.		25-25403-11					-							
		Support Structure		25-29094-45					x							
		Primary Structure		25-29093-15					x							
		Insulation & External Markings		25-29095-3					x							
		Antenna & Spacer		25-29096-3					x							
		Plate-Identification		21-51600-329					x							
39b		Cable & Equipment Installation		25-25404-16					-							
		Battery, Squib		10-20942-2					x							
		Battery, Squib		10-20942-4					x							
		Cable Set SE-35B		55018-106					-							
		Cable		AN37192-315					x							
		Cable		AN37194-315					x							
		Cable		AN37196-315					x							

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WEIGHT AND BALANCE CHANGE RECORD									
11.4.3									
ASSOCIATE CONTRACTOR	BOEING	CONTRACT NO.	AF04(647)-289	REPORT NO.	WTS-1108-028				
COMPONENT	SECTION 39	LOT NO.		DATE	10/18/63				
MODEL NO.	WS-133A	DRAWING NO.	25-25402-36	PREPARED	CB/RH				
SERIAL NO.	0000028	U.O. MISSILE	0000028	APPROVED	GO				
EQUIPMENT CHANGE RECORD		WEIGHT AND BALANCE							
PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS		
			ARM	MOMENT	ARM	MOMENT	ARM	MOMENT	
1	25-25402-36 Instr. Group Trainer (As Weighed)	139.80	54.23	7,581.6	98.96	13,834.4	99.59	13,922.7	
2									
3									
4									
5	ADD:								
6	6AM37194-315 Cable-Autonetics	3.30	74.2		115.5		102.8		
7	7AM37196-315 Cable-Autonetics	1.37	50.4		106.9		111.4		
8									
9									
10									
11	25-25402-36 Instr. Group Trainer (Complete)	144.47	54.65	7,895.5	99.41	14,362.0	99.76	14,414.6	
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									

11.5

# **ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION** **APPLICABLE TO CTLI SECTION 8/N 0000028 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specifications, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 / 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fir, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

11.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION  
APPLICABLE TO CTLI SECTION S/N 0000028 AND INSTALLATION KIT**

(Cont.)

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATION IN THIS CHANGE
620	Addition of Static Dissipators on 47 Section and 1st Stage Skirt	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmer	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge with Cable Strap	3	Negl.	Yes
657	Revisions of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 0000029

12.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries check lists, and ECP lists applicable to this installation. Page 114 summarizes the complete installation mass properties and consists of data from page 115 (average mass properties of downstage components), page 116 (predicted sealant changes), and page 120 (actual weight of CTLI section S/N 0000029). In addition, page 117 presents summary check lists by production section as backup data for page 115. Page 121 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

12.2 WEIGHT & BALANCE SUMMARY TOTAL ORLE KIT INSTALLATION CTLI WAFER S/N 0000029						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x 10 <sup>-3</sup>	
						LONG. °	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			149.4	54.7	99.8	100.1	1004	.003
5			Silo							
6			Aero							
7	42	G&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.9	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			19.45	65.1	111.7	120.1	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.45	55.4	112.1	120.5	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.45		55.4	112.1	120.5		
37	47	Interstage 1-2			26.0	74.1	114.8	125.2	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			283.1					
49			Silo							
50			Aero							
51			Base							
52			Jett							

2-5550-0-58 \* Boeing Section Stations (See Missile Station Diagram)

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12.2 WEIGHT & BALANCE SUMMARY ONLY (AVERAGE WEIGHT COMPONENTS).						REPORT NO. _____ DATE _____					
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>		
						LONG.	LAT.	VERT.	ROLL	PITCH	
1	41	RV Spacer									
2			Silo								
3			Aero								
4	39	CTLI Section			4.39	56.0	107.5	110.7	0	0	
5			Silo								
6			Aero								
7	42	G&C Section			6.94	67.5	112.0	114.3	0	0	
8			Silo								
9			Aero								
10	44	3rd Stage Engine			17.65	84.6	108.5	117.4	0	.002	
11			Silo								
12			Aero								
13			Base								
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0	
15			Silo								
16			Aero								
17			Base								
18			Silo								
19		Jettisoned Portion	Aero								
20			Base								
21			Jett	- 1.90		57.7	110.3	117.8	0	0	
22	45	Interstage 2-3 (Aft)			10.25	64.9	111.8	120.3	0	.001	
23			Silo								
24			Aero								
25	46	2nd Stage Engine			25.73	102.1	112.6	121.4	0	.009	
26			Silo								
27			Aero								
28			Base								
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0	
30			Silo								
31			Aero								
32			Base								
33			Silo								
34		Jettisoned Portion	Aero								
35			Base								
36			Jett	- 1.45		55.4	112.1	120.5	0	0	
37	47	Interstage 1-2 (Aft)			25.46	73.7	113.0	123.6	0	.002	
38			Silo								
39			Aero								
40	48	1st Stage Engine			29.83	111.5	117.7	130.1	0	.025	
41			Silo								
42			Aero								
43			Base								
44	49	Skirt			9.73	74.0	119.5	128.3	0	0	
45			Silo								
46			Aero								
47			Base								
48		MISSILE			135.63						
49			Silo								
50			Aero								
51			Base								
52			Jett								

\* Boozing Section Stations (See Missile Station Diagram)

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12.2 RBS 5-62 CHARGES INSTALLED AT VANDENBERG AIR FORCE BASE**						REPORT NO. _____ DATE _____					
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10-3		
						LONG.*	LAT.	VERT.	ROLL	PITCH	
1	41	RV Spacer									
2			Silo								
3			Aero								
4	39	CTLI Section			.2	54.5	111.5	111.5			
5			Silo								
6			Aero								
7	42	G&C Section			.4	65.4	110.5	113.5			
8			Silo								
9			Aero								
10	44	3rd Stage Engine			.2	80.9	109.3	116.2			
11			Silo								
12			Aero								
13			Base								
14	45	Interstage 2-3			.2	53.6	110.8	116.7			
15		(Fwd)	Silo								
16			Aero								
17			Base								
18		Jettisoned Portion	Silo								
19			Aero								
20			Base								
21			Jett	.2		53.6	110.8	116.7			
22	45	Interstage 2-3			.2	85.0	103.0	101.8			
23		(Aft)	Silo								
24			Aero								
25	46	2nd Stage Engine			0	-	-	-			
26			Silo								
27			Aero								
28			Base								
29	47	Interstage 1-2			0	-	-	-			
30		(Fwd)	Silo								
31			Aero								
32			Base								
33		Jettisoned Portion	Silo								
34			Aero								
35			Base								
36			Jett								
37	47	Interstage 1-2			.5	94.7	102.0	103.4			
38		(Aft)	Silo								
39			Aero								
40	48	1st Stage Engine			.8	161.3	116.2	128.0			
41			Silo								
42			Aero								
43			Base								
44	49	Skirt			.2	101.3	119.2	133.9			
45			Silo								
46			Aero								
47			Base								
48		MISSILE			2.7						
49			Silo								
50			Aero								
51			Base								
52			Jett								

\* Boiling Section Stations (See Missile Station Diagram)

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12.4.1				ACTUAL WEIGHT RECORD - CTLI SECTION			
U/O MISSILE 0000029		DRAWING NO. 25-25402-36		CHECK LIST NO. 39		REPORT NO. WTB-1044-029	
MISSILE MODEL WS-133A		DCN		REPORTED BY RS/JH		PAGE NO.	
CONFIGURATION		ADCN		CHECKED BY		DATE 7/30/63	

LONGITUDINAL REFERENCE DATUM

LATERAL REFERENCE DATUM

VERTICAL REFERENCE DATUM

WEIGHING DATA				DIMENSIONAL DATA				
REACTION	GR. WT.	TARE	CORR.	NET WT.	DIM. INCHES	DIM. INCHES	DIM. INCHES	
RF	66.50	9.30		27.20	AF	42.007	EA	84.510
RH	67.45	37.65		29.80	AH	42.023	EB	84.505
RE	117.15	72.15		45.00	BE	62.996	FC	115.490
RG	80.55	45.70		34.85	BG	62.999	FD	115.495
TOTAL	301.65	164.80		136.85	C	50.000	H	100.000
					D	60.000	M	100.000

LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	27.20	42.007		RA	47.75	84.510		RB	24.85	77.476	
RH	29.80	42.023		RB	24.85	84.505		RD	31.65	77.481	
RE	45.00	62.996		RC	32.60	115.490		RA	47.75	115.500	
RG	34.85	62.999		RD	31.65	115.495		RC	32.60	115.500	
AS CG	136.85	54.26	7,425.2	AS CG	136.85	99.06	13,555.7	AS CG	136.85	99.80	13,658.0

(RR) = Rear Reaction

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SERIAL NUMBER: 0000029

CHECK LIST NO. 39		12 4.2 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)													
DATE		MODEL WS-133A		FINAL ASSEMBLY DRAWING NO. 25-25402-36		Mo 7 Day 30 Yr 63											
ITEM NUMBER	SECTION 39	MISSILE NO.	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT				MISSILE				
									BASIC WEIGHT	AS WEIGHED	REMOTE SITE SHIPMENT	AS RECEIVED	REMOTE SITE	AS WEIGHED	REMOTE SITE	LAUNCH	
39	Instrumentation Group-Trainer Test			25-25402-36													
39a	CTLI Structure Assy.			25-25403-11													
	Support Structure			25-29094-45													
	Primary Structure			25-29093-15													
	Insulation & External Markings			25-29095-3													
	Antenna & Spacer			25-29096-3													
	Plate-Identification			21-51600-329													
39b	Cable & Equipment Installation			25-25404-16													
	Battery, Squib			10-20942-4													
	Battery, Squib			10-20942-2													
	Cable Set SE-35B			55018-106													
	Cable			AN37192-315													
	Cable			AN37194-315													
	Cable			AN37196-315													

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12.4.3		WEIGHT AND BALANCE CHANGE RECORD							
ASSOCIATE CONTRACTOR <u>BOEING</u>		CONTRACT NO. <u>AF04(647)-289</u>		REPORT NO. <u>WBS-1044-029</u>					
COMPONENT <u>SECTION 39</u>		LOT NO.		DATE <u>7/30/63</u>					
MODEL NO. <u>WB-133A</u>		DRAWING NO. <u>25-25402-36</u>		PREPARED					
SERIAL NO. <u>0000029</u>		U.O. MISSILE		APPROVED					
EQUIPMENT CHANGE RECORD		WEIGHT AND BALANCE							
PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT		X AXIS		Y AXIS		Z AXIS	
		WEIGHT		ARM	MOMENT	ARM	MOMENT	ARM	MOMENT
1	25-25402-36 Instr. Group Trainer (As Veched)	136.85		54.26	7,425.2	99.06	13,555.7	99.80	13,658.0
2									
3									
4									
5	ADD:								
6	AN37194-315 Cable - Autometrics	3.20		74.2		115.5		102.8	
7	AN37196-315 Cable - Autometrics	1.35		50.4		106.9		111.4	
8	10-20942-2 Battery	3.38		53.9		100.2		92.0	
9									
10									
11									
12									
13	25-25402-36 Instr. Group Trainer (Complete)	144.78		54.66	7,913.14	99.52	14,408.95	99.79	14,447.94
14									
15									
16									
17									
18									
19									
20									
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31									
32									

12.5

# **ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION** **APPLICABLE TO CTLI SECTION S/N 0000029 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 15 April 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20842-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
506	CTLI Raceway Cover Revision	1	- .2	Yes
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in the report.

\*\* These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

CTLI SECTION, S/N 0000031

13.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 123 summarizes the complete installation mass properties and consists of data from page 124 (average mass properties of downstage components), page 125 (predicted sealant changes), and page 129 (actual weight of CTLI section S/N 0000031). In addition, page 126 presents summary check lists by production section as backup data for page 124. Page 130 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

13.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000031						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			147.6	54.8	99.7	100.2	.004	.003
5			Silo							
6			Aero							
7	42	O&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.9	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3 (Aft)			19.45	65.1	111.7	120.1	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	-1.45		55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			26.0	74.1	114.8	125.2	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			281.3					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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13.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
LINE NO.	STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	56.0	107.5	110.7	0	0
5			Silo							
6			Aero							
7	42	G&C Section			6.94	67.5	112.0	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.65	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.90		57.7	110.3	117.8		
22	45	Interstage 2-3 (Aft)			19.25	64.9	111.8	120.3	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.45		55.4	112.2	120.6		
37	47	Interstage 1-2 (Aft)			25.46	73.7	115.0	125.6	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.73	74.0	119.5	128.3	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.63					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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13.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**						REPORT NO. _____				
						DATE _____				
LINE	ITEM	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA	
						LONG. =	LAT.	VERT.	SLUG FT <sup>2</sup> x10 <sup>-3</sup>	ROLL PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			.2	53.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3			.2	85.0	103.0	101.8		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			0	-	-	-		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2			.5	94.7	102.2	103.4		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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ACTUAL WEIGHT RECORD - CTLI SECTION			
13.4.1	DRAWING NO. 25-25402-36	CHECK LIST NO. 39	REPORT NO. WTS-1101-031
U/O MISSILE 000001	DCN	REPORTED BY CB/WB	PAGE NO.
MISSILE MODEL WS-133A	ADCN	CHECKED BY BW	DATE 10/16/63
CONFIGURATION			

LONGITUDINAL REFERENCE DATUM

LATERAL REFERENCE DATUM

VERTICAL REFERENCE DATUM

WEIGHING DATA				DIMENSIONAL DATA											
REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.	
RF	59.20	20.25		38.95	FC	73.45	39.35		34.10	AF	42.007	EA	84.510	GB	77.478
RH	50.50	32.15		18.15	RD	80.20	49.40		30.80	AH	42.023	EB	84.503	GD	77.481
RE	100.70	66.80		33.90	RA	75.80	29.15		46.65	BE	62.996	FC	115.490	JA	115.500
RG	104.35	56.95		47.40	RB	85.40	58.55		26.85	BG	62.999	FD	115.493	JC	115.500
TOTAL	314.75	176.35		138.40	TOTAL	314.85	176.45		138.40	C		H		M	

LONGITUDINAL C.G.			LATERAL C.G.			VERTICAL C.G.		
REACTION	NET WT.	MOMENT	REACTION	NET WT.	MOMENT	REACTION	NET WT.	MOMENT
RF	38.95	42.007	RA	46.65	84.510	RB	26.85	77.478
RH	18.15	42.023	RB	26.85	84.503	RD	30.80	77.481
RE	33.90	62.996	RC	34.10	115.490	RA	46.65	115.500
RG	47.40	62.999	RD	30.80	115.493	RC	34.10	115.500
AS WGD	138.40	7,520.6	AS WGD	138.40	99.04	AS WGD	138.40	99.66
								13,793.3

(RR) = Rear Reaction





13.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION**  
**APPLICABLE TO CTLI SECTION S/N 0000031 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WB-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No**
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

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**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION  
APPLICABLE TO CTLI SECTION S/N 0000031 AND INSTALLATION KIT**

(Continued)

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
626	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmer	3	Negl.	Yes
639	Prevent Interference of Linear Shape Change with Lable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 0000032

- 14.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 132 summarizes the complete installation mass properties and consists of data from page 133 (average mass properties of downstage components), page 134 (predicted sealant changes), and page 138 (actual weight of CTLI section S/N 0000032). In addition, page 135 presents summary check lists by production section as backup data for page 133. Page 139 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

14.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000032						REPORT NO. _____ DATE _____				
LINE	ITEM	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x 10 <sup>-3</sup>	
						LONG. #	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2		Silo								
3		Aero								
4	39	CTLI Section			147.8	54.8	99.7	100.2	.004	.003
5		Silo								
6		Aero								
7	42	G&C Section			7.3	67.4	111.9	114.3	0	0
8		Silo								
9		Aero								
10	44	3rd Stage Engine			17.9	84.6	108.5	117.4	0	.002
11		Silo								
12		Aero								
13		Base								
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9	0	0
15		(Fwd)								
16		Silo								
17		Aero								
18		Base								
19		Jettisoned	{							
20		Portion								
21		Jett		- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			19.45	65.1	111.7	120.1	0	.001
23		(Aft)								
24		Silo								
25	46	2nd Stage Engine			25.7	102.1	112.6	121.4	0	.009
26		Silo								
27		Aero								
28		Base								
29	47	Interstage 1-2			- 1.45	55.4	112.1	120.5	0	0
30		(Fwd)								
31		Silo								
32		Aero								
33		Base								
34		Jettisoned	{							
35		Portion								
36		Jett		- 1.45		55.4	112.1	120.5		
37	47	Interstage 1-2			26.0	74.1	114.8	125.2	0	.002
38		(Aft)								
39		Silo								
40	49	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41		Silo								
42		Aero								
43		Base								
44	49	Skirt			9.9	74.5	119.5	128.4	0	0
45		Silo								
46		Aero								
47		Base								
48		MISSILE			281.5					
49		Silo								
50		Aero								
51		Base								
52		Jett								

\* Boeing Section Stations (See Missile Station Diagram)

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14.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
LINE	3	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	56.0	107.5	110.7	0	0
5			Silo							
6			Aero							
7	42	G&C Section			6.94	67.5	112.0	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.65	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.90		57.7	110.3	117.8		
22	45	Interstage 2-3 (Aft)			19.25	64.9	111.8	120.3	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.45		55.4	112.2	120.6		
37	47	Interstage 1-2 (Aft)			25.46	73.7	115.0	125.6	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Scirt			9.73	74.0	119.5	128.3	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.63					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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14.2 IMS 9-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10-3	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			.2	53.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3			.2	85.0	103.0	101.8		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			0	-	-	-		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2			.5	94.7	102.0	103.4		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48	MISSILE				2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

2-5550-0-58 \* Boeing Section Stations (See Missile Station Diagram)

REV. SYM. E \*\* Reference D2-13954-534

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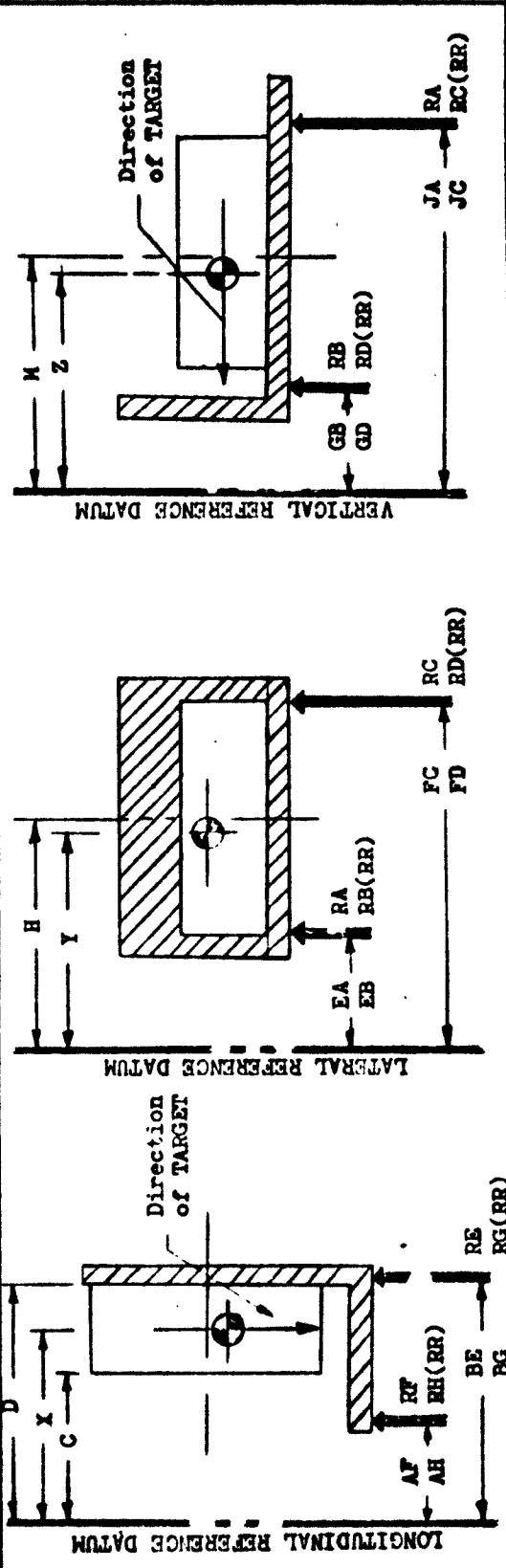
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REPORT NO. WTS-1102-032  
PAGE NO. \_\_\_\_\_  
DATE 10/16/63

CHECK LIST NO. 39  
REPORTED BY CB/MB  
CHECKED BY \_\_\_\_\_

DRAWING NO. 25-25402-36  
DCN . J  
ADCN

U/O MISSILE 000032  
MISSILE MODEL WS-133A  
CONFIGURATION



WEIGHING DATA										DIMENSIONAL DATA					
REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.	DDM.	INCHES	DDM.	INCHES	DDM.	INCHES
RF	31.40	8.35		23.05	PC	67.25	35.15		32.10	AF	42.007	EA	84.510	GB	77.470
RH	78.60	44.30		34.30	RD	86.25	53.50		32.75	AH	42.023	EB	84.505	GD	77.480
RE	129.00	78.90		50.10	RA	82.30	33.30		49.00	BE	62.996	FC	115.490	JA	115.500
RG	76.15	44.95		31.20	RB	79.35	54.55		24.80	BG	62.999	FD	115.495	JC	115.500
TOTAL	315.15	176.50		138.65	TOTAL	315.15	176.50		138.65	C	50.000	H	100.000	M	100.000
										D	60.000				

LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	23.05	42.007		RA	49.00	84.510		RB	24.80	77.478	
RH	34.30	42.623		RB	24.80	84.505		RD	32.75	77.481	
RE	50.10	62.996		RC	32.10	115.490		RA	49.00	115.500	
RG	31.20	62.999		RD	32.75	115.495		RC	32.10	115.500	
AS WGD	138.65	54.32	7,534.3	AS WGD	138.65	99.00	13,726.4	AS WGD	138.65	99.72	13,826.1

**(RR) = Rear Reaction**

SERIAL NUMBER: 0000032

CHECK LIST NO. 39	DATE	14.4.2	MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE)			
				Mo	Day	Yr	
				10			
				16			
				63			
MODEL <u>MS-133A</u> FINAL ASSEMBLY DRAWING NO. <u>25-25402-36</u>				COMPONENT			
SECTION <u>39</u> MISSILE NO. <u>          </u>				MISSILE			
MISSILE COMPONENT <u>CHLI</u> COMPONENT PART NO. <u>Noted</u>				COMPONENT			
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	LAUNCH
39	Instrumentation Group-Trainer Test	25-25402-36					
39a	CHLI Structure Assy.	25-25403-11					
	Support Structure	25-29094-45					
	Primary Structure	25-29093-15					
	Insulation & External Markings	25-29095-3					
	Antenna & Spacer	25-29096-3					
	Plate-Identification	21-51600-329					
39b	Cable & Equipment Installation	25-25404-16					
	Battery, Squib	10-20942-2					
	Battery, Squib	10-20942-4					
	Cable Set SE-353	55018-106					
	Cable	AM37192-315					
	Cable	AM37194-315					
	Cable	AM37196-315					

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REV. STD. E

WEIGHT AND BALANCE CHANGE RECORD									
14.4.3		ASSOCIATE CONTRACTOR <u>BOEING</u>		CONTRACT NO. <u>AF04(647)-289</u>		REPORT NO. <u>WBS-1102-032</u>			
COMPONENT <u>SECTION 39</u>		LOT NO.				DATE <u>10/16/63</u>			
MODEL NO. <u>WB-133A</u>		DRAWING NO. <u>25-25402-36</u>				PREPARED <u>CB/MB</u>			
SERIAL NO. <u>000032</u>		U.O. MISSILE				APPROVED <u>GO</u>			
EQUIPMENT CHANGE RECORD				WEIGHT AND BALANCE					
ITEM	PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS	
				ARM	MOMENT	ARM	MOMENT	ARM	MOMENT
1	25-25402-36	Instr. Group Trainer (As Weighed)	138.65	54.32	7,531.3	99.00	13,126.4	99.72	13,826.1
2									
3									
4									
5		ADD:							
6	AW37194-315	Cable-Autonetics	3.25	74.2		115.5		102.8	
7	AW37196-315	Cable-Autonetics	1.35	50.4		106.9		111.4	
8									
9									
10	25-25402-36	Instr. Group Trainer (Complete)	143.25	54.73	7,840.5	99.45	14,246.1	99.90	14,310.6
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									



14.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION  
APPLICABLE TO CTLI SECTION S/N 0000032 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 / 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/E Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

14.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION  
APPLICABLE TO CTLL SECTION S/N 0000032 AND INSTALLATION KIT**

(Continued)

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	POM R/F Section Digital Data Programmers	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 0000034

15.1

DISCUSSION

Data are not available for CTLI section 25-25402-36, S/N 0000034 at this time. When data are available, this section of the document will be revised to reflect a CTLI Installation similar to the other sections.

15.2 WEIGHT AND BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000034					REPORT NO. _____ DATE _____					
ITEM NO.	QUANTITY	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> X10-3	
						LONG.	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section								
5			Silo							
6			Aero							
7	42	Q&C Section								
8			Silo							
9			Aero							
10	44	3rd Stage Engine								
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3								
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett							
22	45	Interstage 2-3								
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine								
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2								
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2								
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine								
41			Silo							
42			Aero							
43			Base							
44	49	Start								
45			Silo							
46			Aero							
47			Base							
48		MISSILE								
49			Silo							
50			Aero							
51			Base							
52			Jett							

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15.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENT)						REPORT NO. _____ DATE _____				
ITEM NO.	CTLI NO.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> X10 <sup>-3</sup>	
						LONG.	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section								
5			Silo							
6			Aero							
7	42	G&C Section								
8			Silo							
9			Aero							
10	44	3rd Stage Engine								
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3								
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21		Jett	Jett							
22	45	Interstage 2-3								
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine								
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2								
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36		Jett	Jett							
37	47	Interstage 1-2								
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine								
41			Silo							
42			Aero							
43			Base							
44	49	Skirt								
45			Silo							
46			Aero							
47			Base							
48		MISSILE								
49			Silo							
50			Aero							
51			Base							
52			Jett							

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15.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE						REPORT NO. _____ DATE _____				
ITEM NO.	REV.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> X10 <sup>-3</sup>	
						LONG.	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section								
5			Silo							
6			Aero							
7	42	G&C Section								
8			Silo							
9			Aero							
10	44	3rd Stage Engine								
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3								
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett							
22	45	Interstage 2-3								
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine								
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2								
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2								
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine								
41			Silo							
42			Aero							
43			Base							
44	49	Skirt								
45			Silo							
46			Aero							
47			Base							
48		MISSILE								
49			Silo							
50			Aero							
51			Base							
52			Jett							

CHECK LIST NO.	15.3 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)			
	DATE	MODEL	FINAL ASSEMBLY DRAWING NO. 21-52900-6	Mo	Day	Yr
SECTION 39 THRU 49			MISSILE			
MISSILE COMPONENT			COMPONENT			
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM
			BASIC WEIGHT			
			AS WEIGHED			
			REMOTE SITE			
			SHIPMENT			
			AS RECEIVED			
			REMOTE SITE			
			AS WEIGHED			
			REMOTE SITE			
			LAUNCH			

2-5550-0-21

REV. 524

15.4.1

U/O MISSILE

MISSILE MODEL

CONFIGURATION

DRAWING NO.

DCN

ADCN

CHECK LIST NO.

REPORTED BY

CHECKED BY

REPORT NO.

PAGE NO.

DATE

ACTUAL WEIGHT RECORD - CTLI SECTION

LONGITUDINAL REFERENCE DATUM

LATERAL REFERENCE DATUM

VERTICAL REFERENCE DATUM

WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF					RC				
RH					RD				
RE	NO DATA AVAILABLE				RA	NO DATA AVAILABLE			
RG					RB				
TOTAL					TOTAL				

DIMENSIONAL DATA

DDM.	INCHES	DDM.	INCHES	DDM.	INCHES
AF		EA		GB	
AH		EB		GD	
BE		FC		JA	
BG		FD		JC	
C		H		M	
D					

LONGITUDINAL C.G.

REACTION	NET WT.	ARM	MOMENT
RF			
RH			
RE	NO DATA AVAILABLE		
RG			
AS WGD			

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA			
RB			
RC	NO DATA AVAILABLE		
RD			
AS WGD			

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB			
RD			
RA	NO DATA AVAILABLE		
RC			
AS WGD			

(RR) = Rear Reaction

2-5550-0-53 R1

REV. SYN. E



15.4.3 WEIGHT AND BALANCE CHANGE RECORD									
ASSOCIATE CONTRACTOR		BOEING		CONTRACT NO.		AF04(647)-289		REPORT NO.	
COMPONENT		SECTION 39		LOT NO.				DATE	
MODEL NO.		WS-133A		DRAWING NO.		25-25402-36		PREPARED	
SERIAL NO.		0000034		U.O. MISSILE		0000034		APPROVED	
EQUIPMENT CHANGE RECORD				WEIGHT AND BALANCE					
LINE	PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS	
				ARM	MOMENT	ARM	MOMENT	ARM	MOMENT
1									
2									
3									
4									
5									
6									
7									
8									
9		NO DATA AVAILABLE							
10									
11									
12									
13									
14									
15									
16									
17									
18									
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32									

2-5550-0-11 R1

REV. SYM. F

15.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION  
APPLICABLE TO CTLI SECTION S/N 00000<sup>31</sup> AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model  
Specification, Trainer-Test Group, Guided Missiles (S-133-1006-O-1).

NO DATA AVAILABLE

CTLI SECTION, S/N 0000035

16.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 150 summarizes the complete installation mass properties and consists of data from page 151 (average mass properties of downstage components), page 152 (predicted sealant changes), and page 156 (actual weight of CTLI section S/N 0000035). In addition, page 153 presents summary check lists by production section as backup data for page 151. Page 157 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-MPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODE" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

16.2 WEIGHT & BALANCE SUMMARY TOTAL ONLY K&E IMPERIALATION ONLY WAFER S/N 0000035						REPORT NO. _____ DATE _____				
LINE	S/N	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			147.4	54.8	99.7	100.2	.004	.003
5			Silo							
6			Aero							
7	42	G&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.9	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			19.45	65.1	111.7	120.1	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.45	55.4	112.1	120.5	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.45		55.4	112.1	120.5		
37	47	Interstage 1-2			26.0	74.1	114.8	125.2	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			281.1					
49			Silo							
50			Aero							
51			Base							
52			Jett							

2-3550-0-58 \* Boiling Section Stations (See Missile Station Diagram)

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16.2 WEIGHT & BALANCE SUMMARY CGLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> 10-3	
						LONG <sup>P</sup>	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	76.6	107.5	110.7	0	0
5			Silo							
6			Aero							
7	42	G&C Section			6.94	67.5	112.0	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.63	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.90	57.7	110.3	117.8	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.90		57.7	110.3	117.8		
22	45	Interstage 2-3			19.23	64.9	111.8	120.3	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			23.73	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.45	55.4	112.1	120.5	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.45		55.4	112.2	120.6		
37	47	Interstage 1-2			23.46	73.7	115.0	125.6	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.71	74.0	119.5	126.3	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.63					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Diving Section Stations (See Missile Station Diagram)

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16.2 NOS 5-62 CHANGES INSTALLED AT VAN HANDEL AIR FORCE BASE**						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> X 10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	94.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	69.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			.2	53.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3			.2	85.0	103.0	101.8		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			0	-	-	-		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2			.5	94.7	102.0	103.4		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Housing Section Stations (See Missile Station Diagram)

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**STERIL NUMBER 0000035**

ACTUAL WEIGHT RECORD - CTLLI SECTION			
16.4.1	DRAWING NO. 25-25402-36	CHECK LIST NO. 39	REPORT NO. WTB-1043-035
U/O MISSILE 0000035	DCN	REPORTED BY RB/JH	PAGE NO.
MISSILE MODEL WB-133A	ADCN	CHECKED BY	DATE 7/30/63
CONFIGURATION			

LONGITUDINAL REFERENCE DATUM

LATERAL REFERENCE DATUM

DIMENSIONAL DATA

WEIGHING DATA				DIMENSIONAL DATA															
REACTION	GR. WT.	TARE	CORR.	REACTION	GR. WT.	TARE	CORR.	REACTION	GR. WT.	TARE	CORR.	REACTION	GR. WT.	TARE	CORR.	REACTION	GR. WT.	TARE	CORR.
RF	63.15	33.60		RC	52.55	17.60		AF	42.007	EA	84.510	GB	77.478						
RH	39.40	13.75		RD	93.45	65.30		AH	42.083	EB	84.505	GD	77.481						
RE	89.35	48.87		RA	69.65	45.25		BE	62.998	FC	115.490	JA	115.500						
RG	107.95	69.12		RB	64.80	36.80		BG	62.999	FD	115.492	JC	115.500						
TOTAL	299.85	164.95		TOTAL	299.85	164.95		C	30.000	H	100.000	M	100.000						
								D	60.000										

LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	29.95	42.007		RA	44.40	84.510		RB	27.40	77.478	
RH	25.65	42.023		RB	27.40	84.505		RD	28.15	77.481	
RE	41.10	62.996		RC	34.95	115.490		RA	44.40	115.500	
RG	38.20	62.999		RD	28.15	115.495		RC	34.95	115.500	
AS AGD	134.90	54.35	7.331.7	AS AGD	134.90	99.00	13.355.2	AS AGD	134.90	99.84	13,468.9

(RR) = Rear Reaction

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**RECORD** NO. 82-13843-1  
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WEIGHT AND BALANCE CHANGE RECORD											
M.A.3		WEIGHT AND BALANCE									
ASSOCIATE CONTRACTOR		CONTRACT NO.		REPORT NO.		DATE		PREPARED		APPROVED	
COMPONENT		LOT NO.		ARM		MOMENT		ARM		MOMENT	
MODEL NO.		DRAWING NO.		ARM		MOMENT		ARM		MOMENT	
SERIAL NO.		U.O. MISSILE		ARM		MOMENT		ARM		MOMENT	
1	25-25402-36	Instr. Group Trainer (As Weighed)	134.90	54.35	7.331.7	99.00	13.355.2	99.84	13.468.9		
2											
3											
4											
5											
6											
7	701-37194-315	Cable-Antennas	3.20	74.2		115.5		102.8			
8	801-37196-315	Cable-Antennas	1.35	50.4		106.9		111.4			
9	910-20942-8	Battery	3.38	53.9		100.2		92.0			
10											
11											
12											
13	25-25402-36	Instr. Group Trainer (Complete)	142.83	54.75	7.819.48	99.47	14.207.69	99.83	14.258.73		
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											
31											
32											

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BOEING

NO.

12-13943-1

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16.5

# **ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION** **APPLICABLE TO CTLI SECTION S/N 000035 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 15 April 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP No. (WS-133A-NO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Gap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Form Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
506	CTLI Raceway Cover Revision	1	- .2	Yes
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MACH 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MACH 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

# ACTIVE PAGE RECORD

SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES					SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES				
			PAGE NO.	REV SYM	PAGE NO.	REV SYM	PAGE NO.				PAGE NO.	REV SYM	PAGE NO.	REV SYM	PAGE NO.
	1	A									49	B			
	2	F	2.1	F	2.2	F					50	B			
	3										51	B			
	4	B	4.1	E	4.2	F	4.3	F			52	B			
	5										53	B			
	6	E									54	B			
	7										55	B			
	8										56	B			
	9										57	B			
	10										58	B			
	11										59	B			
	12										60	B			
	13										61	B			
	14										62	B			
	15										63	B			
	16										64	B			
	17										65	B			
	18										66	B			
	19										67	B			
	20										68	B			
	21										69	B			
	22										70	C			
	23										71	C			
	24										72	C			
			25	A							73	C			
			26	A							74	C			
			27	A							75	C			
			28	A							76	C			
			29	A							77	C			
			30	A							78	C			
			31	A							79	C			
			32	A							80	C			
			33	A							81	C			
			34	A							82	C			
			35	A							83	C			
			36	A							84	C			
			37	A							85	C			
			38	A							86	C			
			39	A							87	E			
			40	A							88	E			
			41	A							89	E			
			42	A							90	E			
			43	B							91	E			
			44	B							92	E			
			45	B							93	E			
			46	B							94	E			
			47	B							95	E			
			48	B							96	E			

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**BOEING**

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SECT. 2 PAGE 2

# ACTIVE PAGE RECORD

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			PAGE NO.	REV SYM	PAGE NO.	REV SYM	PAGE NO.				PAGE NO.	REV SYM	PAGE NO.	REV SYM	PAGE NO.
			97	E							145	F			
			98	E							146	F			
			99	E							147	F			
			100	E							148	F	148.1	F	
			101	E							149	E			
			102	E							150	E			
			103	E	103.1	E					151	E			
			104	E							152	E			
			105	E							153	E			
			106	E							154	E			
			107	E							155	E			
			108	E							156	E			
			109	E							157	E			
			110	E							158	F			
			111	E							159	F			
			112	E	112.1	E					160	F			
			113	E							161	F			
			114	E							162	F			
			115	E							163	F			
			116	E							164	F			
			117	E							165	F			
			118	E							166	F			
			119	E							167	F			
			120	E							168	F			
			121	E							169	F			
			122	E							170	F			
			123	E							171	F			
			124	E							172	F			
			125	E							173	F	173.1	F	
			126	E							174	F			
			127	E							175	F			
			128	E							176	F			
			129	E							177	F			
			130	E	130.1	E					178	F			
			131	E							179	F			
			132	E							180	F			
			133	E							181	F			
			134	E							182	F	182.1	F	
			135	E							183	F			
			136	E							184	F			
			137	E							185	F			
			138	E							186	F			
			139	E	139.1	E					187	F			
			140	P							188	F			
			141	P							189	F			
			142	P							190	F			
			143	P							191	F	191.1	F	
			144	P							192	F			

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REV SYM F

**BOEING**

NO. D2-13943-1

PAGE 2.1

# ACTIVE PAGE RECORD

SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES				SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES				SECTION	ORIG REL PAGE NO.	REV SYM
			PAGE NO.	REV SYM	PAGE NO.	REV SYM				PAGE NO.	REV SYM	PAGE NO.	REV SYM			
			193													
			194													
			195													
			196													
			197													
			198													
			199													
			200													
					200.1	F										

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REV SYM F

**BOEING**

NO. DT-1345-1

SECT.

PAGE

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
A	<p>Revised pages 1, 4, 10.</p> <p>Added pages 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42.</p> <p>Added Moments of Inertia to page 10.</p> <p>Added Sections 3.0 and 4.0 to the document.</p>	5-17-63	D. Brenden <i>D. Brenden</i>
B	Added Sections 5.0, 6.0 and 7.0 to the document.	6-17-63	D. Brenden <i>D. Brenden</i>
C	Added Sections 8.0 and 9.0 to the document.	7-17-63	D. Brenden <i>D. Brenden</i>
D	<p>Revised pages 2, 3, 4.1</p> <p>Added pages 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112.</p>	8-16-63	D. Brenden <i>D. Brenden</i>
E	<p>Revised pages 2, 2.1, 3, 4.1, 6, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112.</p> <p>Added pages 4.2, 103.1, 112.1, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 130.1, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 133.1</p>	10-23-63	D. Brenden <i>D. Brenden</i>
F	<p>Revised pages 2, 2.1, 3, 4.2, 140, 141, 142, 143, 144, 145, 146, 147, 148.</p> <p>Added pages 2.2, 4.3, 148.1, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 173.1, 174, 175, 176, 177, 178, 179, 180, 181, 182, 182.1, 183, 184, 185, 186, 187, 188, 189, 190, 191, 191.1, 192, 193, 194, 195, 196, 197, 198, 199, 200, 200.1</p>	11-25-63	D. Brenden <i>D. Brenden</i>

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**BOEING**

NO. **BE-13943-1**

SECT.

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## CTLI SECTION, S/N 0000034

- 15.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries check lists, and ECP lists applicable to this installation. Page 141 summarizes the complete installation mass properties and consists of data from page 142 (average mass properties of downstage components), page 143 (predicted sealant changes), and page 147 (actual weight of CTLI section S/N 0000034). In addition, page 144 presents summary check lists by production section as backup data for page 142. Page 148 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-CLDR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODX" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

The following drawings are incorporated in the above section:

10-20942, Battery Instl., DCN G 4-30-63.  
21-52900, Missile Instl., DCN K 9-23-63.  
25-23214, Raceway Instl., DCN F 4-29-63.  
25-25402, 39 Sect. Instl., DCN J 6-17-63.  
25-25406, BMS 5-62 Instl., DCN J 9-13-63.  
25-26878, Cable Assy., DCN J 9-3-63.  
25-29239, Conduit Assy., DCN F 4-4-63, ADCN S-34 7-26-63.  
25-30133, Stand. Instl., DCN D 5-23-63.  
25-31677, Instl. Kit, DCN E 5-4-63, ADCN S-22 7-10-63.  
29-22327, Timer Instl., DCN D 6-24-63, ADCN S-6 9-5-63.

15.2 WEIGHT & BALANCE SUMMARY TOTAL OTLI KIT INSTALLATION OTLI WAFER S/N 000034						REPORT NO. _____ DATE _____				
LINE NO.	REV.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	OTLI Section			149.4	54.7	99.8	100.1	.004	.003
5			Silo							
6			Aero							
7	42	O&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.9	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3 (Aft)			19.45	65.1	111.7	120.1	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett	- 1.45		55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			26.0	74.1	114.8	125.2	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Paint			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISILE			283.1					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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15.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
LINE	STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	56.0	107.5	110.7	0	0
5			Silo							
6			Aero							
7	42	G&C Section			6.94	67.5	112.0	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.65	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.90		57.7	110.3	117.8		
22	45	Interstage 2-3 (Aft)			19.25	64.9	111.8	120.3	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.45		55.4	112.2	120.6		
37	47	Interstage 1-2 (Aft)			25.40	73.7	115.0	125.6	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.73	74.0	119.5	128.3	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.63					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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15.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**						REPORT NO. _____ DATE _____				
13 71 1	13 71 1	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			.2	53.6	110.8	116.7		
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3 (Aft)			.2	85.0	103.0	101.8		
23			Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			0	-	-	-		
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett							
37	47	Interstage 1-2 (Aft)			.5	94.7	102.0	103.4		
38			Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	110.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

**SERIAL NUMBER:** 00000 34

[illegible]

**2-6580-0-21**

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REV. SYM. F

15.4.1				ACTUAL WEIGHT RECORD - CTLI SECTION			
U/O MISSILE 0000034		DRAWING NO. 25-25402-36		CHECK LIST NO. 39		REPORT NO. WTS-11112-034	
MISSILE MODEL WS-133A		DCN J		REPORTED BY CRB/RH		PAGE NO.	
CONFIGURATION		ADCN		CHECKED BY RM		DATE 10/31/63	

LONGITUDINAL REFERENCE DATUM

LATERAL REFERENCE DATUM

VERTICAL REFERENCE DATUM

WEIGHING DATA				DIMENSIONAL DATA				
REACTION	GR. WT.	TARE	CORR.	NET WT.	DIM. INCHES	DIM. INCHES	DIM. INCHES	
RF	54.60	23.95		30.65	AF	42.007	EA	84.510
RH	56.30	28.60		27.70	AH	42.023	EB	84.505
RE	107.15	63.65		43.50	BE	62.996	FC	115.490
RG	98.70	60.40		38.30	BG	62.999	FD	115.495
TOTAL	316.75	176.60		140.15	C	50.000	H	100.000
					D	60.000	M	100.000

LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	30.65	42.007		RA	49.10	84.510		RB	25.40	77.478	
RH	27.70	42.023		RB	25.40	84.505		RD	33.15	77.481	
RE	43.50	62.996		RC	32.50	115.490		RA	49.10	115.500	
RG	38.30	62.999		RD	33.15	115.495		FC	32.50	115.500	
AS CGD	140.15	54.26	7,604.7	AS CGD	140.15	99.02	13,878.0	AS CGD	140.15	99.62	13,961.2

(RR) = Rear Reaction

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STANDARD FORM NO. 0000034

# 15.4.2 MISSILE WEIGHING CHECK LIST

MODEL: MR 100 FINAL ASSEMBLY DRAWING NO. 25-25100-36

CHECK LIST NO.	RECORD OF OPERATIONS (DATE)			CONTAINER	MISSILE
	Mo	Day	Yr		
1	10	31	03		
<p>SECTION 39</p> <p>MISSILE COMPONENT CONT</p> <p>COMPOUND PART NO. 1000</p>					
2	PART NO.			WEIGHT	Y AM
3	DESCRIPTION				
4	1-25100-36				
5	25-25100-36				
6	25-25100-36				
7	25-25100-36				
8	25-25100-36				
9	25-25100-36				
10	25-25100-36				
11	25-25100-36				
12	25-25100-36				
13	25-25100-36				
14	25-25100-36				
15	25-25100-36				
16	25-25100-36				
17	25-25100-36				
18	25-25100-36				
19	25-25100-36				
20	25-25100-36				
21	25-25100-36				
22	25-25100-36				
23	25-25100-36				
24	25-25100-36				
25	25-25100-36				
26	25-25100-36				
27	25-25100-36				
28	25-25100-36				
29	25-25100-36				
30	25-25100-36				
31	25-25100-36				
32	25-25100-36				
33	25-25100-36				
34	25-25100-36				
35	25-25100-36				
36	25-25100-36				
37	25-25100-36				
38	25-25100-36				
39	25-25100-36				
40	25-25100-36				
41	25-25100-36				
42	25-25100-36				
43	25-25100-36				
44	25-25100-36				
45	25-25100-36				
46	25-25100-36				
47	25-25100-36				
48	25-25100-36				
49	25-25100-36				
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51	25-25100-36				
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93	25-25100-36				
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95	25-25100-36				
96	25-25100-36				
97	25-25100-36				
98	25-25100-36				
99	25-25100-36				
100	25-25100-36				

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WEIGHT AND BALANCE CHANGE RECORD

15.4.3

ASSOCIATE CONTRACTOR BOEING  
COMPONENT SECTION 39  
MODEL NO. NB-133A  
SERIAL NO. 000034

CONTRACT NO. AFO4(647)-289  
LOT NO.  
DRAWING NO. 25-25402-36  
U.O. MISSILE

REPORT NO. WTS-1112-034  
DATE 10/31/63  
PREPARED CRB-BH  
APPROVED BW

EQUIPMENT CHANGE RECORD			WEIGHT AND BALANCE						
PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS		
			ARM	MOMENT	ARM	MOMENT	ARM	MOMENT	
1									
2	25-25402-36 Instr. Group Trainer (As Weighed)	140.15	54.26	7,604.7	99.02	13,878.0	99.62	13,961.2	
3									
4									
5									
6	ADD: 6457194-315 Cable-Autonetics	3.25	74.2		115.5		102.8		
7	7457196-315 Cable-Autonetics	1.37	50.4		106.9		111.4		
8									
9									
10	25-25402-36 Instr. Group Trainer (Complete)	144.77	54.67	7,914.9	99.52	14,399.8	99.80	14,447.9	
11									
12									
13									
14									
15									
16									
17									
18									
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31									
32									

15.5

# ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO CTLI SECTION S/N 0000034 AND INSTALLATION KIT

The following ECP's have not been incorporated into "Model Specification Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-B0-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-2088	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

15.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION**  
**APPLICABLE TO CTLI SECTION S/N 0000034 AND INSTALLATION KIT**

(Continued)

ECP NO. (WS-133A-EO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmers	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 0000036

17.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 159 summarizes the complete installation mass properties and consists of data from page 160 (average mass properties of downstage components), page 161 (predicted sealant changes), and page 172 (actual weight of CTLI section S/N 0000036). In addition, page 162 presents summary check lists by production section as backup data for page 160. Page 173 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-C1DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

The following drawings are incorporated in the above section:

10-20942, Battery Instl., DCN G 4-30-63.  
21-52900, Missile Instl., DCN K 9-23-63.  
25-23214, Raceway Instl., DCN F 4-29-63.  
25-25402, 39 Sect. Instl., DCN J 6-17-63.  
25-25406, RMS 5-62 Instl., DCN J 9-13-63.  
25-26878, Cable Assy., DCN J 9-3-63.  
25-29239, Conduit Assy., DCN F 4-4-63, ADCN S-34 7-26-63.  
25-30133, Stand. Instl., DCN D 5-22-63.  
25-31677, Instl. Kit, DCN E 5-4-63, ADCN S-22 7-10-63.  
29-22327, Timer Instl., DCN D 6-24-63, ADCN S-6 9-5-63.

17.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000036						REPORT NO. _____		DATE _____		
LINE NO.	ITEM NO.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			150.1	54.8	29.7	100.2	.004	.003
5			Silo							
6			Aero							
7	42	Q&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			18.0	84.5	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion								
20			Aero							
21			Base							
22			Jett	- 1.7		58.2	110.2	117.9		
23	45	Interstage 2-3 (Aft)			19.5	65.1	111.7	120.2	0	.001
24			Silo							
25			Aero							
26	46	2nd Stage Engine			25.8	102.1	112.6	121.4	0	.009
27			Silo							
28			Aero							
29			Base							
30	47	Interstage 1-2 (Fwd)			- 1.5	55.4	112.1	120.5	0	0
31			Silo							
32			Aero							
33			Base							
34			Silo							
35		Jettisoned Portion								
36			Aero							
37			Base							
38			Jett	- 1.5		55.4	112.1	120.5		
39	47	Interstage 1-2 (Aft)			26.0	74.1	114.7	125.2	0	.002
40			Silo							
41			Aero							
42			Base							
43	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
44			Silo							
45			Aero							
46			Base							
47	49	Skirt			9.9	74.5	119.5	128.4	0	0
48			Silo							
49			Aero							
50			Base							
51		MISSILE			284.0					
52			Silo							
			Aero							
			Base							
			Jett							

2 100 0 58 \* Boeing Section Stations (See Missile Station Diagram)

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17.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
SL	NO	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY *			INERTIA SLUG FT <sup>2</sup> x 10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2		Silo								
3		Aero								
4	39	CTLI Section			4.39	55.9	107.5	110.6	0	0
5		Silo								
6		Aero								
7	42	O&C Section			6.94	67.5	112.0	114.3	0	0
8		Silo								
9		Aero								
10	44	3rd Stage Engine			17.75	84.5	108.5	117.4	0	.002
11		Silo								
12		Aero								
13		Base								
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0
15		Silo								
16		Aero								
17		Base								
18		Silo								
19		Aero								
20		Base								
21		Jettisoned Portion								
		Jett		- 1.90		57.7	110.3	117.8		
22	45	Interstage 2-3 (Aft)			19.26	64.9	111.8	120.4	0	.001
23		Silo								
24		Aero								
25	46	2nd Stage Engine			25.77	102.1	112.6	121.4	0	.009
26		Silo								
27		Aero								
28		Base								
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30		Silo								
31		Aero								
32		Base								
33		Silo								
34		Aero								
35		Base								
36		Jettisoned Portion								
		Jett		- 1.45		55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			25.47	73.7	115.0	125.6	0	.002
38		Silo								
39		Aero								
40	48	1st Stage Engine			29.83	111.5	117.7	130.2	0	.025
41		Silo								
42		Aero								
43		Base								
44	49	Start			9.73	73.9	119.5	128.3	0	0
45		Silo								
46		Aero								
47		Base								
48		MISSILE			135.79					
49		Silo								
50		Aero								
51		Base								
52		Jett								

2 500 0-58 \* Boeing Section Stations (See Missile Station Diagram)

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17.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**						REPORT NO. _____ DATE _____				
LINE NO.	ITEM NO.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	Q&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			.2	53.6	110.8	116.7		
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3 (Aft)			.2	85.0	103.0	101.8		
23			Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			0	-	-	-		
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2 (Aft)			.5	94.7	102.0	103.4		
38			Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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REV. 5-62-0-53 \*\* Reference D2-1394-534

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CHECK LIST NO.		17.3.1 MISSILE WEIGHING CHECK LIST				RECORD OF CHECKING (DATE)			
DATE		MODEL _____ FINAL ASSEMBLY DRAWING NO. 21-52900-20 (Using 25-25406-9)				COMPONENT _____ MISSILE _____			
ITEM NUMBER		SECTION 39		MISSILE NO. _____		AS WEIGHED		REMOTE SITE	
MISSILE COMPONENT		COMPONENT PART NO.		WEIGHT		X ARM		Y ARM	
DESCRIPTION		PART NO.		WEIGHT		X ARM		Y ARM	
Z ARM		PART NO.		WEIGHT		X ARM		Y ARM	
3a	Body Sect. - Trainer Test	25-25402-36	SEE CHANGES RECORD						
3b	Cable Assy. Set - Electrical	25-26878-5	2.21	56.5	109.8	116.0			
3c	Conduit Supt. Set - Raceway	25-29239-23	.91	56.3	111.6	111.6			
3d	Instl. Kit - Trainer Test Group	25-31677-17	1.27	54.5	100.6	100.6			
3e	BMS 5-62 Installed VAPB		*						
<p><b>The following items included in 25-25402-36 are furnished by Autonetics</b></p>									
	SE 35A Cable Set	55008-106	7.5	62.6	109.7	107.2			
	D 24A Analog Multiplexer	55007-106	16.9	53.9	101.4	103.3			
	D 20C Data Programmer	55006-106	16.1	53.9	101.9	97.0			

See page 12 for the net weight and balance effect of BMS 5-62 installed at VAFB







CHECK LIST NO.		17.3.5 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)			
DATE		MODEL		FINAL ASSEMBLY DRAWING NO. 21-52900-20		Mo	
						Day	
						Yr	
ITEM NUMBER		SECTION 46		MISSILE NO.		COMPONENT	
MISSILE COMPONENT		2nd STAGE MOTOR		COMPONENT PART NO.		MISSILE	
DESCRIPTION		PART NO.		WEIGHT		X ARM Y ARM Z ARM	
6a	Cable Assy. Set - Electrical	25-26878-5	10.75	111.1	112.8	121.2	
6b	Conduit Supt. Set - Raceway	25-29239-23	21.93	109.2	112.2	121.2	
6c	Instl. Kit - Trainer Test Group	25-31677-17	2.09	89.9	111.7	120.3	
6d	Timer - Interval	29-22327-2	1.25	67.1	112.5	121.8	
6e	Battery - Squib Activated	10-20942-1	1.40	63.9	112.5	121.8	
6f	BMS 5-62 Installed at VAFB		*				
The following items are furnished by Aerojet							
6g	Destruct System, AODS	359764	4.19	74.8	111.8	120.4	
The following items are deleted from the missile assembly in order to accommodate the CILI Installation							
6h	Raceway Instl.	25-23214-5	15.84	103.1	111.9	120.7	
6i	BMS 5-62 Removed at VAFB		*				

\* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

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CHECK LIST NO.		17.3.6 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)			
DATE		MODEL		FINAL ASSEMBLY DRAWING NO. 21-52900-20		Mo	
						Day	
						Yr	
SECTION 47		MISSILE NO.		COMPONENT			
MISSILE COMPONENT 1-2 INTERSTAGE		COMPONENT PART NO.		MISSILE			
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT
7a	Cable Assy. Set - Electrical	25-26878-5	5.48	71.2	115.8	126.4	AS WEIGHED
7b	Conduit Supt. Set - Raceway	25-29239-23	23.04	78.9	115.0	125.9	AS WEIGHED
7c	Instl. Kit - Trainer Test Group	25-31677-17	1.32	87.4	115.3	125.9	AS WEIGHED
7d	BMS 5-62 Installed at VAFB		*				AS WEIGHED
The following items are deleted from the missile assembled in order to accommodate the GULI installations							
7e	Standards Instl.	25-30133-9	.10	99.8	115.8	126.0	AS WEIGHED
7f	Raceway Instl.	25-23214-5	5.72	89.7	114.8	126.4	AS WEIGHED
7g	BMS 5-62 Removed at VAFB		*				AS WEIGHED
LAUNCH							
REMOTE SITE							
AS RECEIVED							
SHIPMENT							
REMOTE SITE							
WEIGHED							

2-8880-0-21

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\* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

CHECK LIST NO.		17.3.7 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)										
DATE		MODEL		Mo Day Yr										
		FINAL ASSEMBLY DRAWING NO. 21-52900-20		COMPONENT										
		SECTION 48		MISSILE										
		MISSILE COMPONENT 1st STAGE MOTOR		COMPONENT PART NO.										
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	REMOTE SITE SHIPMENT	AS RECEIVED	REMOTE SITE	AS WEIGHED	REMOTE SITE	LAUNCH
8a	Cable Assy. Set - Electrical	25-26878-5	13.12	156.4	118.2	130.5								
8b	Conduit Supt. Set	25-29239-23	13.13	79.3	117.3	130.0								
8c	Instl. Kit - Trainer Test	25-31677-17	2.61	84.1	117.2	129.6								
8d	Timer - Interval	29-22327-1	1.25	70.6	117.7	130.5								
8e	Battery - Squib Activated	10-20942-3	1.40	60.7	117.7	130.5								
8f	BMS 5-62 Instl. at VAFB		*											
	The following items are furnished by Aerojet													
8g	Destruct System, AODS	359764	6.19	78.1	116.9	129.3								
	The following items are deleted from the missile assembly in order to accommodate the C-11 Installation													
8h	Recovery Instl.	25-23214-5	8.07	82.8	117.2	129.8								
8i	BMS 5-62 Removed at VAFB		*											

2-5550-0-21

REV. SYM.

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RODING

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\* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB



2-5550-0-53 RI

REV. SKL

## ACTUAL WEIGHT RECORD - CTLI SECTION

17.4.1

U/O MISSILE 0000036

DRAWING NO. 25-25402-36

CHECK LIST NO. 39

REPORT NO. WTS-1110-Q36

MISSILE MODEL WS-133A

CON

REPORTED BY CB/RI

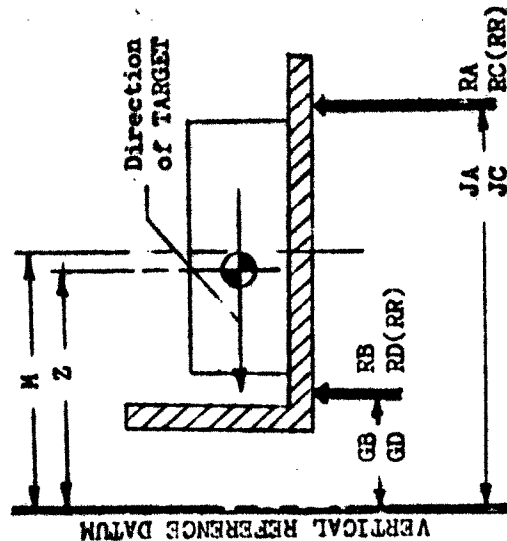
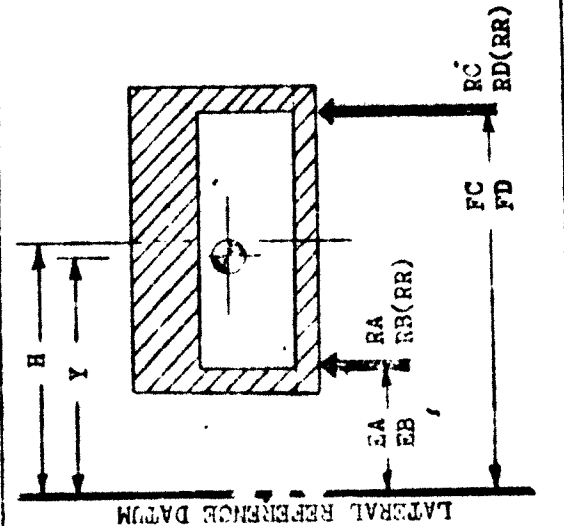
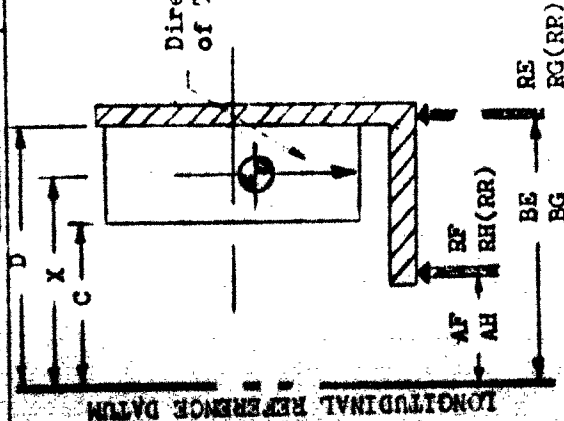
PAGE NO.

CONFIGURATION

ADCN

CHECKED BY

DATE 10-24-63



## WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	38.30	16.10		22.20	RC	94.90	35.15		59.75
RH	71.95	36.40		35.55	RD	59.25	53.50		5.75
RE	122.95	71.35		51.60	RA	54.95	33.30		21.65
RG	82.85	52.60		30.25	RB	107.00	54.55		52.45
TOTAL	316.05	176.45		139.60	TOTAL	316.10	176.50		139.60

## DIMENSIONAL DATA

D.D.A.	INCHES	DIM.	INCHES	DIM.	INCHES
AF	42.007	EA	84.510	GB	77.478
AH	42.023	EB	84.505	GD	77.480
BE	62.996	FC	115.490	JA	115.500
BG	62.999	FD	115.495	JC	115.500
C	50.000	H	100.000	M	100.000
D	60.000				

## LONGITUDINAL C.G.

REACTION	NET WT.	ARM	MOMENT
RF	22.20	42.007	
RH	35.55	42.023	
RE	51.60	62.996	
RG	30.25	62.999	
AS AGD	139.60	54.32	7,582.8

## LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	21.65	84.510	
RB	52.45	84.505	
RC	59.75	115.490	
RD	5.75	115.495	
AS AGD	139.60	99.04	13,826.6

## VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	52.45	77.478	
RD	5.75	77.480	
RA	21.65	115.500	
RC	59.75	115.500	
AS AGD	139.60	99.65	13,910.9

(RR) = Rear Reaction

STATUS 0000036

17.4.2 MISSILE WORKSHEET CHECK LIST

FINAL ASSEMBLY DRAWING NO. 25-25402-36

PERIOD OF CHECKING (DATE)

Mo	10
Day	24
Yr	63

SECTION	MISSILE COMPONENT	DESCRIPTION	PART NO.	DATE	X	Y	Z	COMPONENT			MISSILE
								MISSILE SECTION	MISSILE SECTION	MISSILE SECTION	
39	Instrumentation Control Unit		25-25402-36								
40	Control System		25-25402-11								
	Signal Processor		25-25402-11								
	Timing Unit		25-25402-11								
	Integration Unit		25-25402-11								
	Antenna G.S. Unit		25-25402-11								
	Inter-Unit Link		25-25402-11								
41	Cable Assembly		25-25402-11								
	Reference Cable		25-25402-11								
	Timing Cable		25-25402-11								
	Cable Assembly A		25-25402-11								
	Cable		25-25402-11								
	Cable		25-25402-11								
	Cable		25-25402-11								

17.4.3

**ASSOCIATE CONTRACTOR BOEING**

Section 39

133A

92.000000

**CONTRACT NO.**

LOT NO.

DRAWING NO.

II O. MTSILE.

AlPO<sub>4</sub>(647)-289

\_\_\_\_\_

25-25102-36

**2017-2018**

**REPORT NO.**

DATE \_\_\_\_\_

**PREPARED**

APPROVED

WTS-1110-036

10-24-63

**028/111**

8

## EQUIPMENT CHANGE RECORD

## WEIGHT AND BALANCE

EQUIPMENT CHANGE RECORD									
PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS		
			ARM	MOMENT	ARM	MOMENT	ARM	MOMENT	
1									
2	Instr. Group Trainer (As Weighed)	139.60	54.82	7,532.8	99.04	13,826.6	99.65	13,910.9	
3									
4									
5	ADD:								
6	Cable-Autometrics	3.81	74.2		111.5		102.8		
7	Cable-Autometrics	2.11	50.4		106.9		111.8		
8									
9									
10	Instr. Group Trainer (Complete)	145.52	54.78	7,971.8	99.59	14,492.2	99.91	14,538.5	
11									
12									
13									
14									
15									
16									
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## 17.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION  
APPLICABLE TO CTLI SECTION S/N 0000036 AND INSTALLATION KIT

The following ECP's have not been incorporated into "Model Specification Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20855	3	Negl.	Yes
373	Work-Around for 10-209-2-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

17.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION  
APPLICABLE TO CELL SECTION S/N 0000036 AND INSTALLATION KIT  
(Continued)

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmers	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 0000037

18.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTLI missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 175 summarizes the complete installation mass properties and consists of data from page 176 (average mass properties of downstage components), page 177 (predicted sealant changes), and page 181 (actual weight of CTLI section S/N 0000037). In addition, page 178 presents summary check lists by production section as backup data for page 176. Page 182 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

The following drawings are incorporated in the above section:

- 10-20942, Battery Installation, DCN G 4-30-63
- 21-52900, Missile Installation, DCN K 9-23-63
- 25-23210, Raceway Installation, DCN F 4-29-63
- 25-25402, 39 Section Installation, DCN J 6-17-63
- 25-25406, BMS 5-62 Installation, DCN J 9-13-63
- 25-26878, Cable Assembly, DCN J 9-3-63
- 25-29239, Conduit Assembly, DCN F 4-4-63 - ADCN S-34 7-26-63
- 25-30133, Standard Installation, DCN D 5-22-63
- 25-31677, Installation Kit, DCN E 5-4-63 - ADCN S-22 7-10-63
- 29-22327, Timer Installation, DCN D 6-24-63 - ADCN S-6 9-5-63

18.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000037						REPORT NO. _____ DATE _____				
LINE	STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG. °	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			148.6	54.8	99.8	100.1	.004	.003
5			Silo							
6			Aero							
7	42	C&C Section			2.3	62.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			18.0	84.5	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3 (Aft)			19.5	65.1	111.7	120.2	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.8	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.5	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett	- 1.5		55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			26.0	74.1	114.7	125.2	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Start			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			282.5					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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18.2 WEIGHT & BALANCE SUMMARY CTI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x 10 <sup>-3</sup>	
						LONG. °	LAT.	VERT.	ROLL	PITCH
	1	41	RV Spacer							
	2		Silo							
	3		Aero							
	4	39	CTI Section		4.39	55.9	107.5	110.6	0	0
	5		Silo							
	6		Aero							
	7	42	G&C Section		6.94	67.5	112.0	114.3	0	0
	8		Silo							
	9		Aero							
	10	44	3rd Stage Engine		17.75	84.5	108.5	117.4	0	.002
	11		Silo							
	12		Aero							
	13		Base							
	14	45	Interstage 2-3 (Fwd)		- 1.90	57.7	110.3	117.8	0	0
	15		Silo							
	16		Aero							
	17		Base							
	18		Silo							
	19		Jettisoned							
	20		Portion							
	21		Aero							
	22		Base							
	23		Jett	- 1.90		57.7	110.3	117.8		
	24	45	Interstage 2-3 (Aft)		19.26	54.9	111.3	120.4	0	.001
	25		Silo							
	26		Aero							
	27		Base							
	28	46	2nd Stage Engine		25.77	102.1	112.6	121.4	0	.009
	29		Silo							
	30		Aero							
	31		Base							
	32		Silo							
	33		Jettisoned							
	34		Portion							
	35		Aero							
	36		Base							
	37		Jett	- 1.45		55.4	112.1	120.5		
	38	47	Interstage 1-2 (Aft)		25.47	73.7	115.0	125.6	0	.002
	39		Silo							
	40		Aero							
	41	48	1st Stage Engine		29.83	111.5	117.7	130.2	0	.025
	42		Silo							
	43		Aero							
	44		Base							
	45	49	Skirt		9.73	73.9	119.5	128.3	0	0
	46		Silo							
	47		Aero							
	48		Base							
	49		MISSILE		135.79					
	50		Silo							
	51		Aero							
	52		Base							
			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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18.2 * BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE **						REPORT NO. _____ DATE _____				
LINE NO.	ITEM NO.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10-3	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			.2	53.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3			.2	85.0	107.7	101.8		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			.0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			.0	-	-	-		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2			.5	94.2	102.0	103.4		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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SERIAL NUMBER 0000037

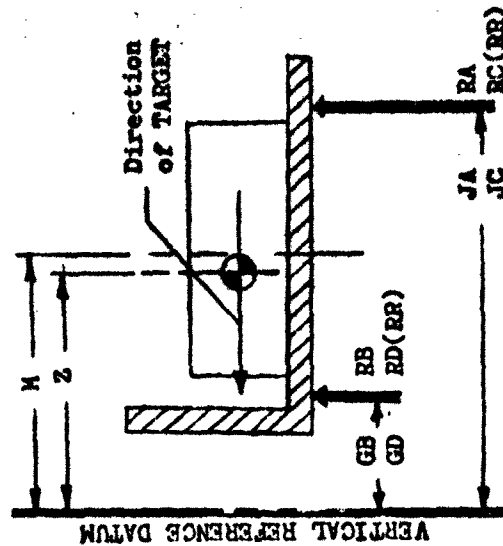
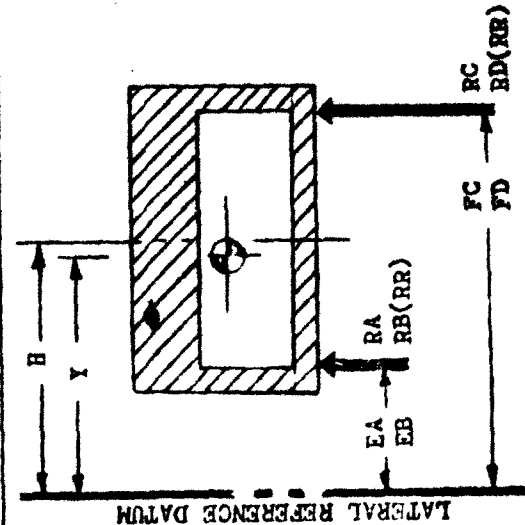
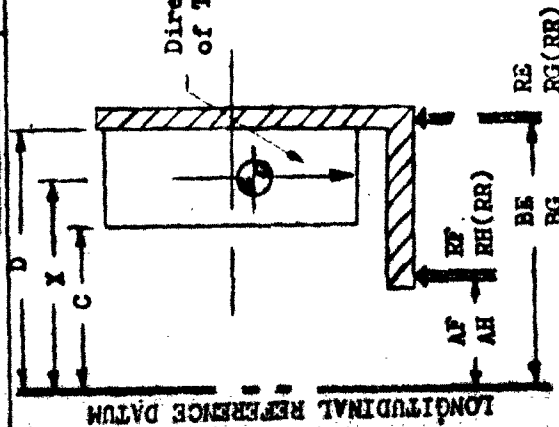
2-5550-0-53 R1

REV. SYM. F

## ACTUAL WEIGHT RECORD - CTLL SECTION

18.4.1

U/O MISSILE 000 0037 DRAWING NO. 25-25402-36 CHECK LIST NO. 39 REPORT NO. WTS-1114-037  
 MISSILE MODEL WS-133A DCN J LB / RH PAGE NO. 1 of 4  
 CONFIGURATION ADCN - BW CHECKED BY DATE 11-1-63



## WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.	DIM.	INCHES	DIM.	INCHES	DIM.	INCHES
RF	46.75	15.75		31.05	RC	77.30	38.65		38.65	AF	42.007	EA	84.510	GB	77.478
RH	53.20	36.75		26.45	RD	72.00	50.10		26.90	AH	42.023	EB	84.505	GD	77.481
RE	114.20	71.70		42.50	RA	72.50	29.95		42.55	BE	62.996	FC	115.490	JA	115.500
RG	91.95	52.50		39.45	RB	89.15	57.80		31.35	BG	62.999	FD	115.493	JC	115.500
TOTAL	316.10	176.65		139.45	TOTAL	315.95	176.50		139.45	C	50.000	H	100.000	N	100.000

## DIMENSIONAL DATA

DIM.	INCHES	DIM.	INCHES	DIM.	INCHES
AF	42.007	EA	84.510	GB	77.478
AH	42.023	EB	84.505	GD	77.481
BE	62.996	FC	115.490	JA	115.500
BG	62.999	FD	115.493	JC	115.500
C	50.000	H	100.000	N	100.000
D	60.000				

## LONGITUDINAL C.G.

REACTION	NET WT.	ARM	MOMENT
RF	31.05	42.007	
RH	26.45	42.023	
RE	42.50	62.996	
RG	39.45	62.999	
AS WGD	139.45	54.35	7,578.5

## LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	42.55	84.510	
RB	31.35	84.505	
RC	38.65	115.490	
RD	26.90	115.495	
AS WGD	139.45	99.07	13,815.6

## VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	31.35	77.478	
RD	26.90	77.481	
RA	42.55	115.500	
RC	38.65	115.500	
AS WGD	139.45	99.62	13,891.8

(RR) = Rear Reaction

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ENGINE

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CHECK LIST NO.	18.4.2	MISSILE WEIGHING CHECK LIST	REPORT OF CHECKS (M1)			COMPONENT	MISSILE
			Mo	Yr	Yr		
12			11	1	63		
DATE							
ENGINE NO.							
SECTION							
MISSILE COMPONENT							
DESCRIPTION							
35	25402-36						
36	25402-11						
37	25402-16						
38	25402-16						
39	25402-16						
40	25402-16						
41	25402-16						
42	25402-16						
43	25402-16						
44	25402-16						
45	25402-16						
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98	25402-16						
99	25402-16						
100	25402-16						

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ASSOCIATE CONTRACTOR	Boeing	CONTRACT NO.	AF 04(647)-289	REPORT NO.	WTS-1114-037
COMPONENT	Section 39	LOT NO.		DATE	11-1-63
MODEL NO.	WS-133A	DRAWING NO.	25-25402-36	PREPARED	CB / RH
SERIAL NO.	0000037	U.O. MISSILE		APPROVED	GO

EQUIPMENT CHANGE RECORD		WEIGHT AND BALANCE						
PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS	
			ARM	MOMENT	ARM	MOMENT	ARM	MOMENT
1	25-25402-36 Instr. Group Trainer (as weighed)	139.45	54.35	7,578.5	99.07	13,815.6	99.62	13,891.8
2								
3								
4								
5	ADD:							
6	AN37194-315 Cable-	3.24	74.2		115.5		102.8	
7	AN37196-315 Cable-	1.34	50.4		106.9		111.4	
8								
9								
10								
11	25-25402-36 Instr. Group Trainer (Complete)	144.03	54.76	7,886.4	99.51	14,333.1	99.80	14,374.1
12								
13								
14								
15								
16								
17								
18								
19								
20								
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31								
32								

18.5

# ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO CTLI SECTION S/N 0000037 AND INSTALLATION KIT

The following ECP's have not been incorporated into "Model Specification Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-EO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airframe Batteries	3	Negl.	Yes
398	Ordinance Support Revisions 2-3 Interstage Aft	203	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MFCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MFCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers to a Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

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# ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION

## APPLICABLE TO CTLI SECTION S/N 0000037 AND INSTALLATION KIT

(Continued)

ECP NO. (WS-132A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmers	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 0000039

19.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 184 summarizes the complete installation mass properties and consists of data from page 185 (average mass properties of downstage components), page 186 (predicted sealant changes), and page 190 (actual weight of CTLI section S/N 0000039). In addition, page 187 presents summary check lists by production section as backup data for page 185. Page 191 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-OLDR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

The following drawings are incorporated in the above section:

10-20942, Battery Instl., DCN G 4-30-63.  
21-52900, Missile Instl., DCN K 9-23-63.  
25-23214, Raceway Instl., DCN F 4-29-63.  
25-25402, 39 Sect. Instl., DCN J 6-17-63.  
25-25406, HMS 5-62 Instl., DCN J 9-13-63.  
25-26878, Cable Assy., DCN J 9-3-63.  
25-29239, Conduit Assy., DCN F 4-4-63, ADCN S-34 7-26-63.  
25-30133, Stand. Instl., DCN D 5-22-63.  
25-31677, Instl. Kit, DCN E 5-4-63, ADCN S-22 7-10-63.  
29-22327, Timer Instl., DCN D 6-24-63, ADCN S-6 9-5-63.

19.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000039						REPORT NO. _____ DATE _____				
LINE	ITEM	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			150.2	54.8	99.9	100.2	.004	.003
5			Silo							
6			Aero							
7	42	G&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			18.0	84.5	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3 (Aft)			19.5	65.1	111.7	120.2	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.8	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.5	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.5		55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			26.0	74.1	114.7	125.2	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			284.1					
49			Silo							
50			Aero							
51			Base							
52			Jett							

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\* Boeing Section Stations (See Missile Station Diagram)

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19.2 WEIGHT & BALANCE SUMMARY JET I  
(AVERAGE WEIGHT COMPONENTS)

REPORT NO.

DATE

ITEM NO.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			SING. STATION	
					LONG.*	LAT.	VERT.	ROLL	YAW
1	RV Spacer								
2		Silo							
3		Aero							
4	1st Stage Section			4.32	55.2	107.5	110.6	0	0
5		Silo							
6		Aero							
7	2nd Stage Section			6.94	61.5	112.0	115.2	0	0
8		Silo							
9		Aero							
10	1st Stage Engine			17.75	84.5	108.5	117.4	0	.002
11		Silo							
12		Aero							
13		Base							
14	Interstage 2-3 (Fwd)			-1.90	57.7	110.3	117.8	0	0
15		Silo							
16		Aero							
17		Base							
18		Silo							
19	Jettisoned Portion								
20		Aero							
21		Base							
22		Jett	-1.20		57.7	110.3	117.8		
23	Interstage 2-3 (Aft)			12.26	64.2	111.8	120.4	0	.001
24		Silo							
25		Aero							
26	2nd Stage Engine			25.71	102.1	112.5	121.4	0	.002
27		Silo							
28		Aero							
29		Base							
30	Interstage 1-2 (Fwd)			-1.45	55.4	112.1	120.5	0	0
31		Silo							
32		Aero							
33		Base							
34		Silo							
35	Jettisoned Portion								
36		Aero							
37		Base							
38		Jett	-1.45		55.4	112.1	120.5		
39	Interstage 1-2 (Aft)			25.47	73.7	115.5	125.6	0	.002
40		Silo							
41		Aero							
42	1st Stage Engine			29.83	111.5	117.7	130.2	0	.025
43		Silo							
44		Aero							
45		Base							
46	3rd Stage			9.73	73.9	119.5	128.3	0	0
47		Silo							
48		Aero							
49		Base							
50	MISSILE			135.79					
51		Silo							
52		Aero							
53		Base							
54		Jett							

2-550-0-58 \* Basing Section Stations (See Missile Station Diagram)

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19.2 BMS 5-02 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**					REPORT NO. _____				
					DATE _____				
NO.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10-3	
					LONG.*	LAT.	VERT.	ROLL	PITCH
1	41 PV Spacer								
2		Silo							
3		Aero							
4	42 I Section			.2	54.5	111.5	111.5		
5		Silo							
6		Aero							
7	43 RC Section			.4	65.4	110.5	113.5		
8		Silo							
9		Aero							
10	44 5th Stage Engine			.2	80.9	109.5	116.2		
11		Silo							
12		Aero							
13		Base							
14	45 Interstage 2-3 (FWI)			.2	53.6	110.8	116.7		
15		Silo							
16		Aero							
17		Base							
18		Silo							
19	46 Tailored Portion		.2		53.6	110.8	115.7		
20		Aero							
21		Base							
22		Jett							
23	47 Interstage 2-3 (AFI)			.2	85.0	103.6	101.8		
24		Silo							
25		Aero							
26	48 4th Stage Engine			.6	-	-	-		
27		Silo							
28		Aero							
29		Base							
30	49 Interstage 1-2 (FWI)			.2	-	-	-		
31		Silo							
32		Aero							
33		Base							
34		Silo							
35	50 Tailored Portion								
36		Aero							
37		Base							
38		Jett							
39	51 Interstage 1-2 (FWI)			.5	24.7	102.2	103.4		
40		Silo							
41		Aero							
42	52 5th Stage Engine			.8	161.3	116.2	128.2		
43		Silo							
44		Aero							
45		Base							
46	53 3rd			.2	101.3	119.2	133.9		
47		Silo							
48		Aero							
49		Base							
50	MISSILE			2.7					
51		Silo							
52		Aero							
53		Base							
54		Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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## ACTUAL WEIGHT RECORD - CTLI SECTION

19.4.1

U/O MISSILE 0000039

MISSILE MODEL WS-133A

CONFIGURATION

DRAWING NO. 25-25402-30

DCN

ADCN

CHECK LIST NO. 39

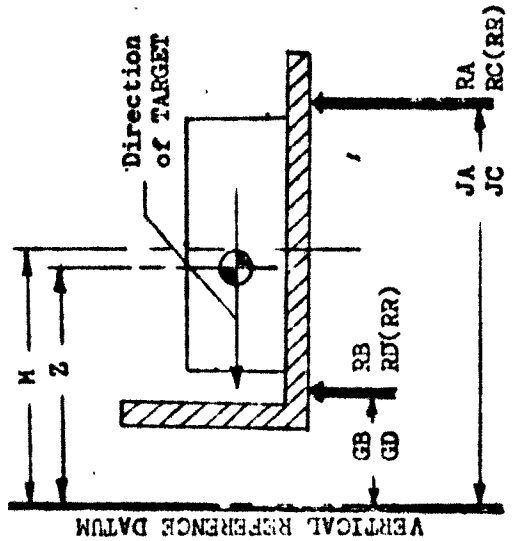
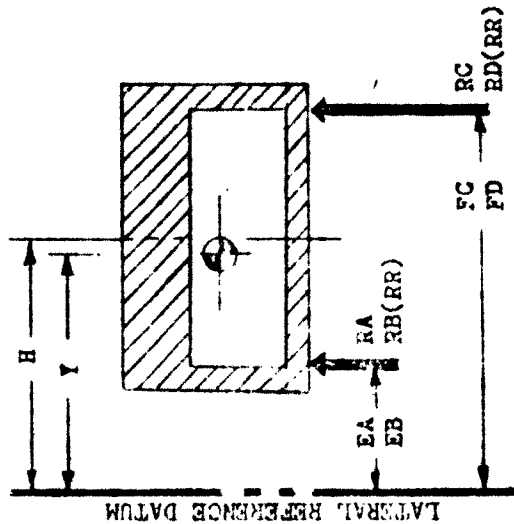
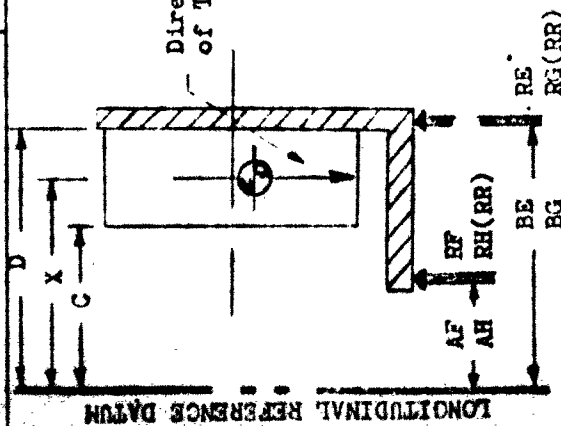
REPORTED BY

CHECKED BY

REPORT NO.

PAGE NO.

DATE



## WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	45.30	32.70		12.60	RC	80.00	35.80		44.20
RH	65.10	20.00		45.10	RD	74.50	53.10		21.40
RE	115.90	55.05		60.85	RA	69.95	32.85		37.10
RG	89.90	68.80		21.10	RB	91.80	54.85		36.95
TOTAL	316.20	176.55		139.65	TOTAL	316.25	176.60		139.65

## DIMENSIONAL DATA

REACTION	INCHES	DIM. INCHES	DIM. INCHES
AF	42.007	EA	84.510
AH	42.023	EB	84.505
BE	62.996	FC	115.490
BG	62.999	FD	115.495
C	50.000	H	100.000
D	60.000	M	100.000

## LONGITUDINAL C.G.

REACTION	NET WT.	ARM	MOMENT
RF	12.60	42.007	
RH	45.10	42.023	
RE	60.85	62.996	
RG	21.10	62.999	
AS XGD	139.65	54.32	7.587.1

## LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
EA	37.10	84.510	
EB	36.95	84.505	
FC	44.20	115.490	
FD	21.46	115.495	
AS XGD	139.65	99.06	13.834.0

## VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
GB	36.95	77.478	
GD	21.40	77.481	
RA	37.10	115.500	
RC	44.20	115.500	
AS XGD	139.65	99.61	13.911.1

(RR) = Rear Reaction

FORM 100-1 : 0000039

CHECK LIST NO.	19.4.2	MISSILE UNIT WITH CHECK LIST	RECORD OF CHECKING (DAY)				REMARKS
			Mo	11	14	63	
DATE	MODEL	FIELD ASSEMBLY DRAWING NO.	Y	Y	Y	Y	MISSILE
SECTION	SECTION	SECTION	SECTION	SECTION	SECTION	SECTION	SECTION
MISSILE CONNECTION	MISSILE CONNECTION	MISSILE CONNECTION	MISSILE CONNECTION	MISSILE CONNECTION	MISSILE CONNECTION	MISSILE CONNECTION	MISSILE CONNECTION
DESCRIPTION	DESCRIPTION	DESCRIPTION	DESCRIPTION	DESCRIPTION	DESCRIPTION	DESCRIPTION	DESCRIPTION
39	Interference of signal	39-1					
39A	Interference of signal	39A-1					
	Interference of signal	39A-2					
	Interference of signal	39A-3					
	Interference of signal	39A-4					
	Interference of signal	39A-5					
	Interference of signal	39A-6					
	Interference of signal	39A-7					
	Interference of signal	39A-8					
	Interference of signal	39A-9					
	Interference of signal	39A-10					
	Interference of signal	39A-11					
	Interference of signal	39A-12					
	Interference of signal	39A-13					
	Interference of signal	39A-14					
	Interference of signal	39A-15					
	Interference of signal	39A-16					
	Interference of signal	39A-17					
	Interference of signal	39A-18					
	Interference of signal	39A-19					
	Interference of signal	39A-20					
	Interference of signal	39A-21					
	Interference of signal	39A-22					
	Interference of signal	39A-23					
	Interference of signal	39A-24					
	Interference of signal	39A-25					
	Interference of signal	39A-26					
	Interference of signal	39A-27					
	Interference of signal	39A-28					
	Interference of signal	39A-29					
	Interference of signal	39A-30					
	Interference of signal	39A-31					
	Interference of signal	39A-32					
	Interference of signal	39A-33					
	Interference of signal	39A-34					
	Interference of signal	39A-35					
	Interference of signal	39A-36					
	Interference of signal	39A-37					
	Interference of signal	39A-38					
	Interference of signal	39A-39					
	Interference of signal	39A-40					
	Interference of signal	39A-41					
	Interference of signal	39A-42					
	Interference of signal	39A-43					
	Interference of signal	39A-44					
	Interference of signal	39A-45					
	Interference of signal	39A-46					
	Interference of signal	39A-47					
	Interference of signal	39A-48					
	Interference of signal	39A-49					
	Interference of signal	39A-50					
	Interference of signal	39A-51					
	Interference of signal	39A-52					
	Interference of signal	39A-53					
	Interference of signal	39A-54					
	Interference of signal	39A-55					
	Interference of signal	39A-56					
	Interference of signal	39A-57					
	Interference of signal	39A-58					
	Interference of signal	39A-59					
	Interference of signal	39A-60					
	Interference of signal	39A-61					
	Interference of signal	39A-62					
	Interference of signal	39A-63					
	Interference of signal	39A-64					
	Interference of signal	39A-65					
	Interference of signal	39A-66					
	Interference of signal	39A-67					
	Interference of signal	39A-68					
	Interference of signal	39A-69					
	Interference of signal	39A-70					
	Interference of signal	39A-71					
	Interference of signal	39A-72					
	Interference of signal	39A-73					
	Interference of signal	39A-74					
	Interference of signal	39A-75					
	Interference of signal	39A-76					
	Interference of signal	39A-77					
	Interference of signal	39A-78					
	Interference of signal	39A-79					
	Interference of signal	39A-80					
	Interference of signal	39A-81					
	Interference of signal	39A-82					
	Interference of signal	39A-83					
	Interference of signal	39A-84					
	Interference of signal	39A-85					
	Interference of signal	39A-86					
	Interference of signal	39A-87					
	Interference of signal	39A-88					
	Interference of signal	39A-89					
	Interference of signal	39A-90					
	Interference of signal	39A-91					
	Interference of signal	39A-92					
	Interference of signal	39A-93					
	Interference of signal	39A-94					
	Interference of signal	39A-95					
	Interference of signal	39A-96					
	Interference of signal	39A-97					
	Interference of signal	39A-98					
	Interference of signal	39A-99					
	Interference of signal	39A-100					

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19.4.3 WEIGHT AND BALANCE CHANGE RECORD									
ASSOCIATE CONTRACTOR		BOEING		CONTRACT NO.		AF04(647)-289		REPORT NO.	
COMPONENT		SECTION 39		LOT NO.				DATE	
MODEL NO.		WS-133		DRAWING NO.		25-25402-36		PREPARED	
SERIAL NO.		0000039		U.C. MISSILE				APPROVED	
EQUIPMENT CHANGE RECORD				WEIGHT AND BALANCE					
PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS ARM	X AXIS MOMENT	Y AXIS ARM	Y AXIS MOMENT	Z AXIS ARM	Z AXIS MOMENT	
1	25-25402-36 Instr. Group Trainer (As Weighed)	139.65	54.32	7,587.1	99.06	13,834.0	99.61	13,911.1	
2									
3									
4									
5	ADD:								
6	AN31278-315 Cable-Autonetics	3.91	74.2		115.5		102.8		
7	AN31279-315 Cable-Autonetics	2.08	50.4		106.9		111.4		
8									
9									
10									
11	25-25402-36 Instr. Group Trainer (Complete)	145.64	54.81	7,982.1	99.62	14,508.0	99.87	14,544.8	
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
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25									
26									
27									
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29									
30									
31									
32									

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19.5

# ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO CTLI SECTION S/N 0000039 AND INSTALLATION KIT

The following ECP's have not been incorporated into "Model Specification Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-EO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, SEA Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20685	3	Negl.	Yes
373	Work-Around for 10-20742-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* These ECP's were incorporated during manufacture of the CTLI wafer. However, the portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

19.5

# ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO CTLI SECTION S/N 0000039 AND INSTALLATION KIT

(Continued)

ECP NO. (WS-100A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmers	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 0000102

20.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 193 summarizes the complete installation mass properties and consists of data from page 194 (average mass properties of downstage components), page 195 (predicted sealant changes), and page 197 (actual weight of CTLI section S/N 0000102). In addition, page 196 presents summary check lists by production section as backup data for page 194. Page 200 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-MMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODC" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

The following drawings are incorporated in the above section:

- 10-20942, Battery Instl., DCN G 4-30-63.
- 21-52900, Missile Instl., DCN K 9-23-63.
- 25-23214, Raceway Instl., DCN F 4-29-63.
- 25-25402, 39 Sect. Instl., DCN J 6-17-63.
- 25-25406, HMS 5-62 Instl., DCN J 9-13-63.
- 25-26878, Cable Assy., DCN J 9-3-63.
- 25-29239, Conduit Assy., DCN F 4-4-63, ADCN S-34 7-26-63.
- 25-30133, Stand. Instl., DCN D 5-22-63.
- 25-31677, Instl. Kit, DCN E 5-4-63, ADCN S-22 7-10-63.
- 29-22327, Timer Instl., DCN D 6-24-63, ADCN S-6 9-5-63.

WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000102						REPORT NO. _____ DATE _____				
LINE	33	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			148.5	54.8	99.7	100.2	.004	.003
5			Silo							
6			Aero							
7	42	G&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			18.0	84.5	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			19.5	65.1	111.7	120.2	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.8	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.5	55.4	112.1	120.5	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.5		55.4	112.1	120.5		
37	47	Interstage 1-2			26.0	74.1	114.7	125.2	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			282.4					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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20.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____					
						DATE _____					
LINE	REV.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10-3		
						LONG. *	LAT.	VERT.	ROLL	PITCH	
1	41	RV Spacer									
2			Silo								
3			Aero								
4	39	CTLI Section			4.39	55.9	107.5	110.6	0	0	
5			Silo								
6			Aero								
7	42	O&C Section			6.94	67.5	112.0	114.3	0	0	
8			Silo								
9			Aero								
10	44	3rd Stage Engine			17.75	84.5	108.5	117.4	0	.002	
11			Silo								
12			Aero								
13			Base								
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0	
15			Silo								
16			Aero								
17			Base								
18			Silo								
19		Jettisoned Portion	Aero								
20			Base								
21			Jett	- 1.90		57.7	110.3	117.8			
22	45	Interstage 2-3 (Aft)			19.26	64.9	111.8	120.4	0	.001	
23			Silo								
24			Aero								
25	46	2nd Stage Engine			25.77	102.1	112.6	121.4	0	.009	
26			Silo								
27			Aero								
28			Base								
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0	
30			Silo								
31			Aero								
32			Base								
33			Silo								
34		Jettisoned Portion	Aero								
35			Base								
36			Jett	- 1.45		55.4	112.1	120.5			
37	47	Interstage 1-2 (Aft)			25.47	73.7	115.0	125.6	0	.002	
38			Silo								
39			Aero								
40	48	1st Stage Engine			29.83	111.5	117.7	130.2	0	.025	
41			Silo								
42			Aero								
43			Base								
44	49	Skirt			9.73	73.9	119.5	128.3	0	0	
45			Silo								
46			Aero								
47			Base								
48		MISSILE			135.79						
49			Silo								
50			Aero								
51			Base								
52			Jett								

\* Boeing Section Stations (See Missile Station Diagram)

2 5590 0 58

REV. SKL I

BOEING

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20.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**						REPORT NO. _____ DATE _____				
LINE	ITEM	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			.2	53.6	110.8	116.7		
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	{							
20		Portion								
21				.2		53.6	110.8	116.7		
22	45	Interstage 2-3 (Aft)			.2	85.0	103.0	101.8		
23			Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			0	-	-	-		
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	{							
35		Portion								
36										
37	47	Interstage 1-2 (Aft)			.5	94.7	102.0	103.4		
38			Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

< 550-0-58

REV. 501. P \*\* Reference D2-13954-53

BOEING

VOA

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PAGE 195

RECORD OF CHECKING (DATE)					
Mo					
Day					
Yr					

RECORD OF CHECKING (DATE)					
Mo					
Day					
Yr					

MISSILE WEIGHING CHECK LIST

MODEL 39 ~~THRU~~ 49 FINAL ASSEMBLY DRAWING NO. \_\_\_\_\_

SECTION \_\_\_\_\_  
MISSILE NO. \_\_\_\_\_

**COMPONENT PART NO.**

PART NO.	WEIGHT	X ARM
1	1.0	1.0
2	1.0	1.0
3	1.0	1.0
4	1.0	1.0
5	1.0	1.0
6	1.0	1.0
7	1.0	1.0
8	1.0	1.0
9	1.0	1.0
10	1.0	1.0
11	1.0	1.0
12	1.0	1.0
13	1.0	1.0
14	1.0	1.0
15	1.0	1.0
16	1.0	1.0
17	1.0	1.0
18	1.0	1.0
19	1.0	1.0
20	1.0	1.0
21	1.0	1.0
22	1.0	1.0
23	1.0	1.0
24	1.0	1.0
25	1.0	1.0
26	1.0	1.0
27	1.0	1.0
28	1.0	1.0
29	1.0	1.0
30	1.0	1.0
31	1.0	1.0
32	1.0	1.0
33	1.0	1.0
34	1.0	1.0
35	1.0	1.0
36	1.0	1.0
37	1.0	1.0
38	1.0	1.0
39	1.0	1.0
40	1.0	1.0
41	1.0	1.0
42	1.0	1.0
43	1.0	1.0
44	1.0	1.0
45	1.0	1.0
46	1.0	1.0
47	1.0	1.0
48	1.0	1.0
49	1.0	1.0
50	1.0	1.0
51	1.0	1.0
52	1.0	1.0
53	1.0	1.0
54	1.0	1.0
55	1.0	1.0
56	1.0	1.0
57	1.0	1.0
58	1.0	1.0
59	1.0	1.0
60	1.0	1.0
61	1.0	1.0
62	1.0	1.0
63	1.0	1.0
64	1.0	1.0
65	1.0	1.0
66	1.0	1.0
67	1.0	1.0
68	1.0	1.0
69	1.0	1.0
70	1.0	1.0
71	1.0	1.0
72	1.0	1.0
73	1.0	1.0
74	1.0	1.0
75	1.0	1.0
76	1.0	1.0
77	1.0	1.0
78	1.0	1.0
79	1.0	1.0
80	1.0	1.0
81	1.0	1.0
82	1.0	1.0
83	1.0	1.0
84	1.0	1.0
85	1.0	1.0
86	1.0	1.0
87	1.0	1.0
88	1.0	1.0
89	1.0	1.0
90	1.0	1.0
91	1.0	1.0
92	1.0	1.0
93	1.0	1.0
94	1.0	1.0
95	1.0	1.0
96	1.0	1.0
97	1.0	1.0
98	1.0	1.0
99	1.0	1.0
100	1.0	1.0

**DESCRIPTION**

**PART NO.**

**THEIR**

**X ARM**

**Y ARM**

**Z ARM**

BASIC	WEIGHT
-------	--------

AS  
WEIGHED

REMOTE SITE	SHIPMENT	AS RECEIVED	REMOTE SITE
-------------	----------	-------------	-------------

AS WEIGHED  
REMOTE SITE

**LAUNCH**

**SUMMARY CHECK LISTS FOR SECTIONS 39 THROUGH 49 ARE IDENTICAL TO THOSE**

**FOUNDED ON PAGES 162 THROUGH 169<sup>3</sup>**

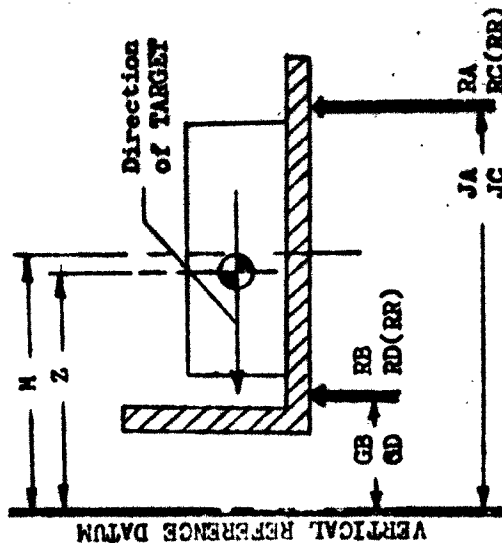
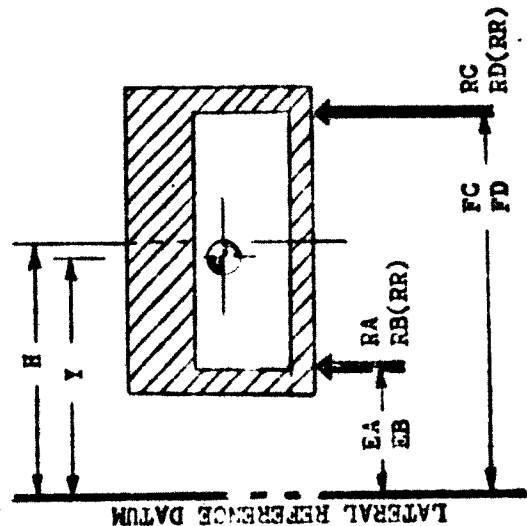
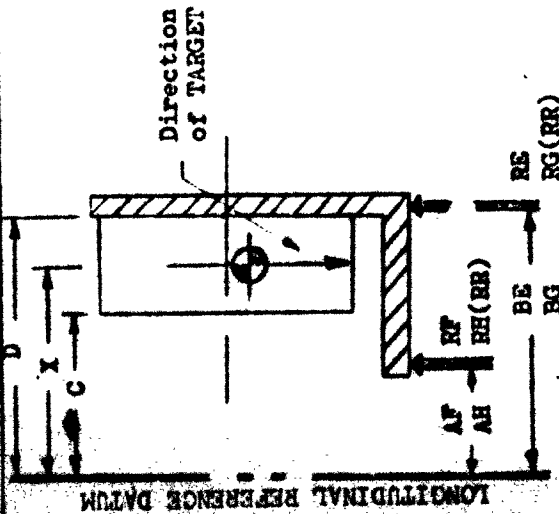
14-00000

U/O MISSILE 0000102  
MISSILE MODEL W8-133  
CONFIGURATION

DRAWING NO. 25-25402-36  
DCN • J  
ADCN       

CHECK LIST NO. \_\_\_\_\_  
REPORTED BY \_\_\_\_\_  
CHECKED BY \_\_\_\_\_

REPORT NO. \_\_\_\_\_  
PAGE NO. \_\_\_\_\_  
DATE 11/7



WEIGHING DATA					
REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION
RF	60.65	30.65		30.00	RC
RM	49.00	21.85		27.15	RD
RE	100.20	56.65		43.55	RA
RO	106.05	67.40		38.65	RB
TOTAL	315.90	176.55		139.35	TOTAL

TESTING DATA				
REACTION	GR. WT.	TARE	CORR.	NET WT.
RC	74.40	34.00		40.40
RD	79.75	54.75		25.00
RA	75.45	34.60		40.85
RB	86.30	53.20		33.10
TOTAL	315.90	176.55		139.35

DIMENSIONAL DATA					
DDIM.	INCHES	DIM.	INCHES	DIM.	INCHES
AF	42.007	EA	84.510	GB	77.500
AH	42.023	EB	84.503	GD	77.485
BE	62.996	FC	115.490	JA	115.500
BG	62.999	FD	115.493	JC	115.500
C	50.000	H	100.000	M	100.000
D	60.000				

LONGITUDINAL C.G.			
REACTION	NET WT.	ARM	MOMENT
RF	30.00	42.007	
RH	27.15	42.023	
RL	43.55	62.996	
RG	38.65	62.999	
AS (GD)	139.35	45.39	7,579.5

LATERAL C.G.			
REACTION	NET WT.	ARM	MOMENT
RA	40.85	84.510	
RB	33.10	84.505	
RC	40.40	115.490	
RD	25.00	115.495	
AS WGD	139.35	99.05	13,802.5

REACTION	NET WT.	ARM	MOMENT
RB	33.10	77.478	
RD	25.00	77.481	
RA	40.85	115.500	
RC	40.40	115.500	
AS WGD	139.35	99.65	13,885.9

**(FR) - First Round**

0000102

CHECK LIST NO.		20.4.2		MISSILE WEIGHING CHECK LIST		RECORD OF CHECKS (DATE)	
DATE	NO.	MODEL	FINAL AND ONLY BARCODE NO.	COMPL. BY	36	Mo.	Day
						11	21
						63	
SECTION	32	MISSILE NO.				COMPONENT	
MISSILE COMPONENT	32	CONDUCTED PART NO.		No.		MISSILE	
DESCRIPTION		PART NO.	WEIGHT	X	Y	Z	AMT
32 Test and Calibration	25-25						
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
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2-8650-0-21

REV. 5TH. P

COPIED NO. 12-13843-1

20.4.3		WEIGHT AND BALANCE CHANGE RECORD	
ASSOCIATE CONTRACTOR	BOEING	CONTRACT NO.	AF04(647)-289
COMPONENT	SECTION 39	LOT NO.	
MODEL NO.	WS-133A	DRAWING NO.	25-25402-36
SERIAL NO.	000102	U.O. MISSILE	
		REPORT NO.	11/21/63
		DATE	11/21/63
		PREPARED	CR/AM
		APPROVED	GO

EQUIPMENT CHANGE RECORD		WEIGHT AND BALANCE							
PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS		
			ARM	MOMENT	ARM	MOMENT	ARM	MOMENT	
1									
2	Instr. Group Trainer (As Weighed)	139.35	54.39	7,579.5	99.05	13,802.5	99.65	13,885.9	
3									
4									
5	ADD:								
6	AK704-315 Cable-Autonetics	3.22	74.2		115.5		102.8		
7	AK706-315 Cable-Autonetics	1.34	50.4		106.9		111.4		
8									
9									
10	Instr. Group Trainer (Complete)	143.91	54.80	7,886.0	99.49	14,317.7	99.83	14,366.2	
11									
12									
13									
14									
15									
16									
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31									
32									

## 20.5

# ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION

## APPLICABLE TO CTLI SECTION S/N 0000102 AND INSTALLATION KIT

The following ECP's have not been incorporated into "Model Specification Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-EO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-00005	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 . Interstage Aft	2&3	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

20.5

# ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION

## APPLICABLE TO CELL SECTION S/N 0000102 AND INSTALLATION KIT

(Continued)

ECP NO. (WS-100A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmers	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

SYMBOL F  
RESHOT  
BECAUSE FIELD  
WAS NOT OPEN.

SYMBOL F  
RESHOT  
BECAUSE FIELD  
WAS NOT OPEN.

# ACTIVE PAGE RECORD

SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES					SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES				
			PAGE NO.	REV SYM	PAGE NO.	REV SYM	PAGE NO.				PAGE NO.	REV SYM	PAGE NO.	REV SYM	PAGE NO.
	1	A									49	E			
	2	B	2.1	F	2.2	F					50	B			
	3	B									51	B			
	4	B	4.1	E	4.2	F	4.3	F			52	B			
	5										53	B			
	6	E									54	B			
	7										55	B			
	8										56	B			
	9										57	B			
	10										58	B			
	11										59	B			
	12										60	B			
	13										61	B			
	14										62	B			
	15										63	B			
	16										64	B			
	17										65	B			
	18										66	E			
	19										67	B			
	20										68	B			
	21										69	B			
	22										70	C			
	23										71	C			
	24										72	C			
	25										73	C			
	26										74	C			
	27										75	C			
	28										76	C			
	29										77	C			
	30										78	C			
	31										79	C			
	32										80	C			
	33										81	C			
	34										82	C			
	35										83	C			
	36										84	C			
	37										85	C			
	38										86	C			
	39										87	E			
	40										88	E			
	41										89	E			
	42										90	E			
	43										91	E			
	44										92	E			
	45										93	E			
	46										94	E			
	47										95	E			
	48										96	E			

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REV SYM F

**BOEING**

NO. 12-13943-1

SECT.

PAGE 2

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			PAGE NO.	REV SYM	PAGE NO.	REV SYM	PAGE NO.				PAGE NO.	REV SYM	PAGE NO.	REV SYM	PAGE NO.
			97	E							145	F			
			98	E							146	F			
			99	E							147	F			
			100	E							148	F	148.1	F	
			101	E							149	E			
			102	E							150	E			
			103	E	103.1	E					151	E			
			104	E							152	E			
			105	E							153	E			
			106	E							154	E			
			107	E							155	E			
			108	E							156	E			
			109	E							157	E			
			110	E							158	F			
			111	E							159	F			
			112	E	112.1	E					160	F			
			113	E							161	F			
			114	E							162	F			
			115	E							163	F			
			116	E							164	F			
			117	E							165	F			
			118	E							166	F			
			119	E							167	F			
			120	E							168	F			
			121	E							169	F			
			122	E							170	F			
			123	E							171	F			
			124	E							172	F			
			125	E							173	F	173.1	F	
			126	E							174	F			
			127	E							175	F			
			128	E							176	F			
			129	E							177	F			
			130	E	130.1	E					178	F			
			131	E							179	F			
			132	E							180	F			
			133	E							181	F			
			134	E							182	F	182.1	F	
			135	E							183	F			
			136	E							184	F			
			137	E							185	F			
			138	E							186	F			
			139	E	139.1	E					187	F			
			140	F							188	F			
			141	F							189	F			
			142	F							190	F			
			143	F							191	F	191.1	F	
			144	F							192	F			

US 8801 0600 ORIG. 8/62

2-3142-2

REV SYM F

**BOEING** NO. D2-13943-1

SECT 1 PAGE 2.1

# ACTIVE PAGE RECORD

SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES					SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES				
			PAGE NO.	REV SYM	PAGE NO.	REV SYM	PAGE NO.	REV SYM			PAGE NO.	REV SYM	PAGE NO.	REV SYM	PAGE NO.
			193	F											
			194	F											
			195	F											
			196	F											
			197	F											
			198	F											
			199	F											
			200	F	200.1	F									

U3 4891 0600 ORIG. 8/62

2-6744-2

REV SYM F

**BOEING**

NO. D2-13043-1

SECT.

PAGE

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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
A	Revised pages 1, 4, 10.  Added pages 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42.  Added Moments of Inertia to page 10. Added Sections 3.0 and 4.0 to the document.	5-17-63	D. Brenden <i>D. Brenden</i>
B	Added Sections 5.0, 6.0 and 7.0 to the document.	6-17-63	D. Brenden <i>D. Brenden</i>
C	Added Sections 8.0 and 9.0 to the document.	7-17-63	D. Brenden <i>D. Brenden</i>
D	Revised pages 2, 3, 4.1  Added pages 2.1, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112.	8-16-63	D. Brenden <i>D. Brenden</i>
E	Revised pages 2, 2.1, 3, 4.1, 6, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112.  Added pages 4.2, 103.1, 112.1, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 130.1, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 159.1	10-23-63	D. Brenden <i>D. Brenden</i>
F	Revised pages 2, 2.1, 3, 4.2, 140, 141, 142, 143, 144, 145, 146, 147, 148.  Added pages 2.2, 4.3, 148.1, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 173.1, 174, 175, 176, 177, 178, 179, 180, 181, 182, 182.1, 183, 184, 185, 186, 187, 188, 189, 190, 191, 191.1, 192, 193, 194, 195, 196, 197, 198, 199, 200, 200.1	11-25-63	D. Brenden <i>D. Brenden</i>

U3 4287 8028 ORIG. 8/68

2-8142-2

REV SYM F

NO. 82-13543-1

SECT.

PAGE 3

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13.4	SECTION 39 DATA 127
13.5	ENGINEERING CHANGE PROPOSAL SUMMARY 130
14.0	<u>CTLI SECTION, S/N 0000032</u>
14.1	DISCUSSION 131
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14.3	MISSILE SECTION SUMMARY CHECK LISTS 135
14.4	SECTION 39 DATA 136
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15.0	<u>CTLI SECTION, S/N 0000034</u>
15.1	DISCUSSION 140
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15.3	MISSILE SECTION SUMMARY CHECK LISTS 144
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16.0	<u>CTLI SECTION, S/N 0000035</u>
16.1	DISCUSSION 149
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16.3	MISSILE SECTION SUMMARY CHECK LISTS 152
16.4	SECTION 39 DATA 154
16.5	ENGINEERING CHANGE PROPOSAL SUMMARY 157
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CTLI SECTION, S/N 0000034

- 15.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTLI missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 141 summarizes the complete installation mass properties and consists of data from page 142 (average mass properties of downstage components), page 143 (predicted sealant changes), and page 147 (actual weight of CTLI section S/N 0000034). In addition, page 144 presents summary check lists by production section as backup data for page 142. Page 148 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system in the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-OLDR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODC" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

The following drawings are incorporated in the above section:

- 10-20942, Battery Instl., DCN G 4-30-63.
- 21-52900, Missile Instl., DCN K 9-23-63.
- 25-23214, Raceway Instl., DCN F 4-29-63.
- 25-25402, 39 Sect. Instl., DCN J 6-17-63.
- 25-25406, EMS 3-62 Instl., DCN J 9-13-63.
- 25-26878, Cable Assy., DCN J 9-3-63.
- 25-29239, Conduit Assy., DCN F 4-4-63, ADCN S-34 7-26-63.
- 25-30133, Stand. Instl., DCN D 5-23-63.
- 25-31677, Instl. Kit, DCN E 5-4-63, ADCN S-22 7-10-63.
- 29-22327, Timer Instl., DCN D 6-24-63, ADCN S-6 9-5-63.

15.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 000034						REPORT NO. _____ DATE _____				
LINE NO.	ITEM NO.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			149.4	54.7	99.8	100.1	.004	.003
5			Silo							
6			Aero							
7	42	G&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.9	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18		Jettisoned Portion	Silo							
19			Aero							
20			Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3 (Aft)			19.45	65.1	111.7	120.1	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33		Jettisoned Portion	Silo							
34			Aero							
35			Base							
36			Jett	- 1.45		55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			26.0	74.1	114.8	125.2	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Boirt			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			283.1					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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15.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
ITEM NO.	REV.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x 10 <sup>-3</sup>	
						LONG.	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	56.0	107.5	110.7	0	0
5			Silo							
6			Aero							
7	42	G&C Section			6.94	67.5	112.0	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.65	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	- 1.90		57.7	110.3	117.8		
22	45	Interstage 2-3 (Aft)			19.25	64.9	111.8	120.3	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett	- 1.45		55.4	112.2	120.6		
37	47	Interstage 1-2 (Aft)			25.46	73.7	115.0	125.6	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Boirt			9.73	74.0	119.5	128.3	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.63					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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15.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**						REPORT NO. _____ DATE _____				
14 71 1	15 72 2	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x 10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section		.2	54.5	111.5	111.5			
5			Silo							
6			Aero							
7	42	Q4C Section		.4	65.4	110.5	113.5			
8			Silo							
9			Aero							
10	44	3rd Stage Engine		.2	80.9	109.3	116.2			
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)		.2	53.6	110.8	116.7			
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	.2	55.6	110.8	116.7			
22	45	Interstage 2-3 (Aft)		.2	85.0	103.0	101.8			
23			Silo							
24			Aero							
25	46	2nd Stage Engine		0	-	-	-			
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)		0	-	-	-			
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2 (Aft)		.5	94.7	102.0	103.4			
38			Silo							
39			Aero							
40	48	1st Stage Engine		.8	161.3	110.2	128.0			
41			Silo							
42			Aero							
43			Base							
44	49	Skirt		.2	101.3	119.2	133.9			
45			Silo							
46			Aero							
47			Base							
48		MISSILE		2.7						
49			Silo							
50			Aero							
51			Base							
52			Jett							

2-550-0-58 \* Boeing Section Stations (See Missile Station Diagram)

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15.4.1 ACTUAL WEIGHT RECORD - CTLLI SECTION									
U/O MISSILE 0000034			DRAWING NO. 25-25402-36			CHECK LIST NO. 39			REPORT NO. WTS-1112-034
MISSILE MODEL WS-133A			DCN			REPORTED BY CFB/RR			PAGE NO.
CONFIGURATION			ADCN			CHECKED BY RW			DATE 10/31/63

LONGITUDINAL REFERENCE DATUM

LATERAL REFERENCE DATUM

VERTICAL REFERENCE DATUM

Direction of TARGET

WEIGHING DATA				DIMENSIONAL DATA				
REACTION	GR. WT.	TARE	CORR.	NET WT.	DIM. INCHES	DIM. INCHES	DIM. INCHES	
RF	54.60	23.95		30.65	AF	42.007	EA	84.510
RH	56.30	28.60		27.70	AH	42.023	EB	84.505
RE	107.15	63.65		43.50	BE	62.996	FC	115.490
RG	98.70	60.40		38.30	BG	62.999	FD	115.495
TOTAL	316.75	176.60		140.15	C	50.000	H	100.000
					D	60.000	M	100.000

LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	30.65	42.007		RA	49.10	84.510		RB	25.40	77.478	
RH	27.70	42.023		RB	25.40	84.505		RD	33.15	77.481	
RE	43.50	62.996		RC	32.50	115.490		RA	49.10	115.500	
RG	38.30	62.999		RD	33.15	115.495		RC	32.50	115.500	
AS CGD	140.15	54.26	7,604.7	AS CGD	140.15	99.02	13,878.0	AS CGD	140.15	99.62	13,961.2

(RR) = Rear Reaction



15.4.3 WEIGHT AND BALANCE CHANGE RECORD									
ASSOCIATE CONTRACTOR BOEING			CONTRACT NO. AF04(647)-289		REPORT NO. WTS-11112-034				
COMPONENT SECTION 39			LOT NO.		DATE 10/31/63				
MODEL NO. WS-133A			DRAWING NO. 25-25402-36		PREPARED CRB-RH				
SERIAL NO. 0000034			U.O. MISSILE		APPROVED RM				
EQUIPMENT CHANGE RECORD			WEIGHT AND BALANCE						
LINE	PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS ARM	X AXIS MOMENT	Y AXIS ARM	Y AXIS MOMENT	Z AXIS ARM	Z AXIS MOMENT
1	225-25402-36	Instr. Group Trainer (As Weighed)	140.15	54.26	7,604.7	99.02	13,878.0	99.62	13,961.2
2									
3									
4									
5		ADD:							
6	AN37194-315	Cable-Autonetics	3.25	74.2		115.5		102.8	
7	AN37196-315	Cable-Autonetics	1.37	50.4		106.9		111.4	
8									
9									
10	225-25402-36	Instr. Group Trainer (Complete)	144.77	54.67	7,914.3	99.52	14,399.8	99.80	14,447.9
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									

15.5

# ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO CTLI SECTION S/N 000034 AND INSTALLATION KIT

The following ECP's have not been incorporated into "Model Specification Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-B0-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
198-J	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	2	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

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**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION**  
**APPLICABLE TO CTLI SECTION S/N 0000034 AND INSTALLATION KIT**

(Continued)

ECP NO. (WS-13A-ED-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmers	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 0000036

17.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTLI missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 159 summarizes the complete installation mass properties and consists of data from page 160 (average mass properties of downstage components), page 161 (predicted sealant changes), and page 172 (actual weight of CTLI section S/N 0000036). In addition, page 162 presents summary check lists by production section as backup data for page 160. Page 173 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

The following drawings are incorporated in the above section:

10-20942, Battery Instl., DCN G 4-30-63.  
21-52900, Missile Instl., DCN K 9-23-63.  
25-23214, Raceway Instl., DCN F 4-29-63.  
25-25402, 39 Sect. Instl., DCN J 6-17-63.  
25-25406, EMS 5-62 Instl., DCN J 9-13-63.  
25-26878, Cable Assy., DCN J 9-3-63.  
25-29239, Conduit Assy., DCN F 4-4-63, ADCN S-34 7-26-63.  
25-30133, Stand. Instl., DCN D 5-27-63.  
25-31677, Instl. Kit, DCN E 5-4-63, ADCN S-22 7-10-63.  
29-22327, Timer Instl., DCN D 6-24-63, ADCN S-6 9-5-63.

17.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000036						REPORT NO. _____ DATE _____				
LINE NO.	ITEM NO.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			150.1	54.8	99.7	100.2	.004	.003
5			Silo							
6			Aero							
7	42	O&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			18.0	84.5	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion								
20			Aero							
21			Base							
22			Jett	- 1.7		58.2	110.2	117.9		
23	45	Interstage 2-3 (Aft)			19.5	65.1	111.7	120.2	0	.001
24			Silo							
25			Aero							
26	46	2nd Stage Engine			25.8	102.1	112.6	121.4	0	.009
27			Silo							
28			Aero							
29			Base							
30	47	Interstage 1-2 (Fwd)			- 1.5	55.4	112.1	120.5	0	0
31			Silo							
32			Aero							
33			Base							
34			Silo							
35		Jettisoned Portion								
36			Aero							
37			Base							
38			Jett	- 1.5		55.4	112.1	120.5		
39	47	Interstage 1-2 (Aft)			26.0	74.1	114.7	125.2	0	.002
40			Silo							
41			Aero							
42			Base							
43	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
44			Silo							
45			Aero							
46			Base							
47	49	Script			9.9	74.5	119.5	128.4	0	0
48			Silo							
49			Aero							
50			Base							
51		MISSILE			284.0					
52			Silo							
			Aero							
			Base							
			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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17.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
SLUG	INCHES	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x 10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2		Silo								
3		Aero								
4	39	CTLI Section			4.39	55.9	107.5	110.6	0	0
5		Silo								
6		Aero								
7	42	O&C Section			6.94	67.5	112.0	114.3	0	0
8		Silo								
9		Aero								
10	44	3rd Stage Engine			17.75	84.5	108.5	117.4	0	.002
11		Silo								
12		Aero								
13		Base								
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0
15		Silo								
16		Aero								
17		Base								
18		Silo								
19		Jettisoned								
20		Portion								
21		Aero								
22		Base								
23		Jett		- 1.90		57.7	110.3	117.8		
24	45	Interstage 2-3 (Aft)			19.26	64.9	111.8	120.4	0	.001
25		Silo								
26		Aero								
27		Base								
28										
29	46	2nd Stage Engine			25.77	102.1	112.6	121.4	0	.009
30		Silo								
31		Aero								
32		Base								
33		Silo								
34		Jettisoned								
35		Portion								
36		Aero								
37		Base								
38		Jett		- 1.45		55.4	112.1	120.5		
39	47	Interstage 1-2 (Aft)			25.47	73.7	115.0	125.6	0	.002
40		Silo								
41		Aero								
42		Base								
43										
44	48	1st Stage Engine			29.83	111.5	117.7	130.2	0	.025
45		Silo								
46		Aero								
47		Base								
48	49	Start			9.73	73.9	119.5	128.3	0	0
49		Silo								
50		Aero								
51		Base								
52		Jett								
		MISSILE			135.79					
		Silo								
		Aero								
		Base								
		Jett								

2-550 0-58 \* Boeing Section Stations (See Missile Station Diagram)

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17.2 HMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**						REPORT NO. _____				
						DATE _____				
12 13 14	15 16 17	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> X10 <sup>-3</sup>	
						LONG. #	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			.2	53.6	110.8	116.7		
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3 (Aft)			.2	85.0	103.0	101.8		
23			Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			0	-	-	-		
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2 (Aft)			.5	94.7	102.0	103.4		
38			Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Scirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48	MISSILE				2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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CHECK LIST NO.		17.3.3 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)				
DATE		MODEL		FINAL ASSEMBLY DRAWING NO. 21-52900-20		Mo		
						Day		
						Yr		
ITEM NUMBER	SECTION 44	MISSILE NO.	COMPONENT					MISSILE
MISSILE COMPONENT 3rd STAGE MOTOR		COMPONENT PART NO.						
DESCRIPTION		PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED
4a	Cable Assy. Set - Electrical	25-26878-5	6.47	92.9	111.2	118.4		
4b	Conduit Supt. Set - Raceway	25-29239-23	15.78	85.4	110.5	117.9		
4c	Instl. Kit - Trainer Test Group	25-31677-17	1.49	80.2	110.7	118.2		
4d	EMS 5-62 Installed at VAFB		*					
The following items are furnished by Aerojet								
4e	Destruct System, AODS	359704	4.03	58.1	99.8	114.0		
The following items are deleted from the missile assembly in order to accommodate the C.I.I. Installation								
4f	Raceway Instl.	25-23214-5	9.93	80.2	110.2	117.6		
4g	Standards Instl.	25-30133-9	.09	68.5	109.4	116.2		
4h	EMS 5-62 Removed at VAFB		*					

\* See page 12 for a summary of the net weight and balance change of EMS 5-62 at VAFB



CHECK LIST NO.		17.3-5		MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)																					
DATE		MODEL		FINAL ASSEMBLY DRAWING NO. 21-52900-20		<table border="1"> <tr> <td>Mo</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Day</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Yr</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>				Mo						Day						Yr					
Mo																											
Day																											
Yr																											
SECTION 46		MISSILE NO.		COMPONENT		MISSILE																					
MISSILE COMPONENT 2nd STAGE MOTOR		COMPONENT PART NO.																									
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	SHIPMENT	AS RECEIVED	REMOTE SITE	AS WEIGHED	REMOTE SITE	LAUNCH													
6a	Cable Assy. Set - Electrical	25-26878-5	10.75	111.1	112.8	121.2																					
6b	Conduit Supt. Set - Raceway	25-29239-23	21.93	109.2	112.2	121.2																					
6c	Instl. Kit - Trainer Test Group	25-31677-17	2.09	89.9	111.7	120.3																					
6d	Timer - Interval	29-22327-2	1.25	67.1	112.5	121.8																					
6e	Battery - Squib Activated	10-20942-3	1.40	63.9	112.5	121.8																					
6f	BMS 5-62 Installed at VAFB		*																								
The following items are furnished by Aerojet																											
6g	Destruct System, AODS	399764	4.19	74.8	111.8	120.4																					
The following items are deleted from the missile assembly in order to accommodate the CTLI Installation																											
6h	Raceway Instl.	25-23214-5	15.84	103.1	111.9	120.7																					
6i	BMS 5-62 Removed at VAFB		*																								

\* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

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CHECK LIST NO.		MISSILE WEIGHING CHECK LIST										RECORD OF CHECKING (DATE)			
DATE		MODEL		FINAL ASSEMBLY DRAWING NO.		21-58900-20		Mo		Day		Yr			
ITEM NUMBER		SECTION 48		MISSILE NO.		COMPONENT PART NO.		BASIC WEIGHT		AS WEIGHED		COMPONENT			
DESCRIPTION		PART NO.		WEIGHT		X ARM		Y ARM		Z ARM		LAUNCH			
1st STAGE MOTOR															
8a	Cable Assy. Set - Electrical	25-26878-5	13.12	156.4	118.2	130.5									
8b	Conduit Bunt. Set	25-29239-23	13.13	79.3	117.3	130.0									
8c	Instl. Kit - Trainer Test	25-31677-17	2.81	84.1	117.2	129.6									
8d	Timer - Interval	29-22327-1	1.25	70.6	117.7	130.5									
8e	Battery - Squib Activated	10-20942-3	1.40	66.7	117.7	130.5									
8f	HMS 5-62 Instl. at VAFB		*												
The following items are furnished by Aerojet															
8g	Destruct System, AODS	359764	6.19	78.1	116.9	129.3									
The following items are deleted from the missile assembly in order to accommodate the CFI Installation															
8h	Recovery Instl.	25-23214-5	8.07	82.8	117.2	129.8									
8i	HMS 5-62 Removed at VAFB		*												

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\* See page 12 for a summary of the net weight and balance change of HMS 5-62 at VAFB



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17.4.1				ACTUAL WEIGHT RECORD - CTLL SECTION			
U/O MISSILE 0000036		DRAWING NO. 25-25402-36		CHECK LIST NO. 39		REPORT NO. WTS-1110-036	
MISSILE MODEL MS-133A		ECN J		REPORTED BY CB/RE		PAGE NO.	
CONFIGURATION		ACCN		CHECKED BY RM		DATE 10-24-63	

LONGITUDINAL REFERENCE DATUM

LATERAL REFERENCE DATUM

VERTICAL REFERENCE DATUM

WEIGHING DATA				DIMENSIONAL DATA				
REACTION	GR. WT.	TARE	CORR.	NET WT.	DIM. INCHES	DIM. INCHES	DIM. INCHES	
RF	38.30	16.10		22.20	AF	42.007	EA	84.510
RH	71.95	36.40		35.55	AH	42.023	EB	84.509
RE	122.95	71.35		51.60	BE	62.996	FC	115.490
RG	82.85	52.60		30.25	EG	62.999	FD	115.499
TOTAL	316.05	176.45		139.60	C	50.000	H	100.000
					D	60.000	M	100.000

LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	22.20	42.007		EA	21.65	84.510		RB	52.45	77.478	
RH	35.55	42.023		EB	52.45	84.509		RD	5.75	77.481	
RE	51.60	62.996		FC	59.75	115.490		RA	21.65	115.500	
RG	30.25	62.999		FD	5.75	115.499		RC	59.75	115.500	
AS AGD	139.60	54.32	7,582.8	AS AGD	139.60	99.04	13,826.6	AS AGD	139.60	99.65	13,910.9

(RR) = Rear Reaction



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17.4.3 WEIGHT AND BALANCE CHANGE RECORD									
ASSOCIATE CONTRACTOR		CONTRACT NO.		REPORT NO.					
COMPONENT		LOT NO.		DATE					
MODEL NO.		DRAWING NO.		PREPARED					
SERIAL NO.		U.O. MISSILE		APPROVED					
SECTION 39		25-25402-36		CB/WM					
WB-133A				CO					
000036									
EQUIPMENT CHANGE RECORD		WEIGHT AND BALANCE							
PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS		
			ARM	MOMENT	ARM	MOMENT	ARM	MOMENT	
1	25-25402-36 Instr. Group Trainer (As Weighed)	139.60	54.82	7,532.8	99.04	13,826.6	99.65	13,910.9	
2									
3									
4									
5	ADD:								
6	AF31278-315 Cable-Autonetics	3.81	74.2		111.5		102.8		
7	AF31279-315 Cable-Autonetics	2.11	50.4		106.9		111.8		
8									
9									
10	25-25402-36 Instr. Group Trainer (Complete)	145.52	54.18	7,971.8	99.59	14,192.2	99.91	14,538.5	
11									
12									
13									
14									
15									
16									
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17.5

# ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO CTLI SECTION S/N 0000036 AND INSTALLATION KIT

The following ECP's have not been incorporated into "Model Specification Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part A	PES, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20855	3	Negl.	Yes
373	Work-Around for 10-20855-2-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-5 Interstage Aft	2&3	Negl.	Yes
415 Part B	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCM 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCM 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

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ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION  
APPLICABLE TO CILI SECTION S/N 0000036 AND INSTALLATION KIT  
(Continued)

ECP NO. (WS-108A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmers	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

# CTLI SECTION, S/N 0000037

18.1

This section of the document describes the data changes created by converting a production line Minuteman missile into a CTLI missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 175 summarizes the complete installation mass properties and consists of data from page 176 (average mass properties of downstage components), page 177 (predicted sealant changes), and page 181 (actual weight of CTLI section S/N 0000037). In addition, page 178 presents summary check lists by production section as backup data for page 176. Page 182 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

The following drawings are incorporated in the above section:

- 10-20942, Battery Installation, DCN G 4-30-63
- 21-52900, Missile Installation, DCN K 9-23-63
- 25-23210, Raceway Installation, DCN F 4-29-63
- 25-25402, 39 Section Installation, DCN J 6-17-63
- 25-25406, BMS 5-62 Installation, DCN J 9-13-63
- 25-26878, Cable Assembly, DCN J 9-3-63
- 25-29239, Conduit Assembly, DCN F 4-4-63 - ADCN 3-34 7-26-63
- 25-30133, Standard Installation, DCN D 5-22-63
- 25-31677, Installation Kit, DCN E 5-4-63 - ADCN S-22 7-10-63
- 29-22327, Timer Installation, DCN D 6-24-63 - ADCN S-6 9-5-63

18.2		WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000037				REPORT NO. _____ DATE _____				
LINE	REV	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> X 10 <sup>-3</sup>	
						LONG.	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			148.6	54.8	99.8	100.1	.004	.003
5			Silo							
6			Aero							
7	42	O/C Section			7.3	62.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			18.0	84.5	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3 (Aft)			19.5	65.1	111.7	120.2	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.8	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.5	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett	- 1.5		55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			26.0	74.1	114.7	125.2	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			282.5					
49			Silo							
50			Aero							
51			Base							
52			Jett							

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18.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____				
						DATE _____				
18 23 3	33 36	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.°	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	55.9	107.5	110.6	0	0
5			Silo							
6			Aero							
7	42	G&C Section			6.94	67.5	112.0	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.75	84.5	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	- 1.90		57.7	110.3	117.8		
22	45	Interstage 2-3 (Aft)			19.26	64.9	111.3	120.4	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.77	102.1	112.6	121.4	0	.002
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett	- 1.45		55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			25.47	73.7	115.0	125.6	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.2	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.73	73.9	119.5	128.3	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.79					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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18.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE **						REPORT NO. _____				
						DATE _____				
13 71	13 72	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x 10 <sup>-3</sup>	
						LONG.°	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			.2	53.6	110.8	116.7		
15			Silo							
16			Aero							
17			Base							
18		Jettisoned Portion	Silo							
19			Aero							
20			Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3 (Aft)			.2	85.0	101.4	101.8		
23			Silo							
24			Aero							
25	46	2nd Stage Engine			.0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			.0	-	-	-		
30			Silo							
31			Aero							
32			Base							
33		Jettisoned Portion	Silo							
34			Aero							
35			Base							
36			Jett							
37	47	Interstage 1-2 (Aft)			.5	94.7	101.2	103.4		
38			Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	129.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

REV. SYN. F \*\* Reference 02-13964-534

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**FINAL ASSEMBLY DRAWING NO.**

MODEL 39 thru 49

DATE \_\_\_\_\_

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# GOING

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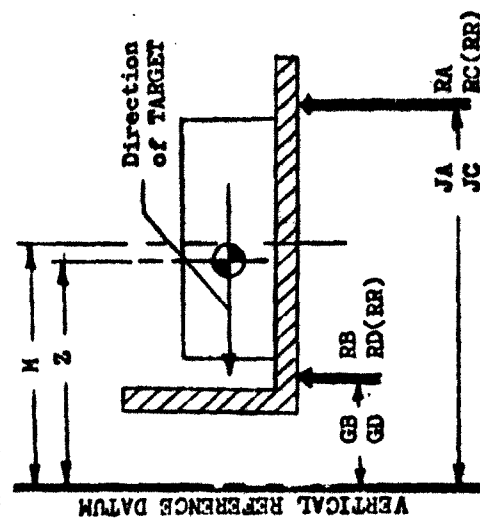
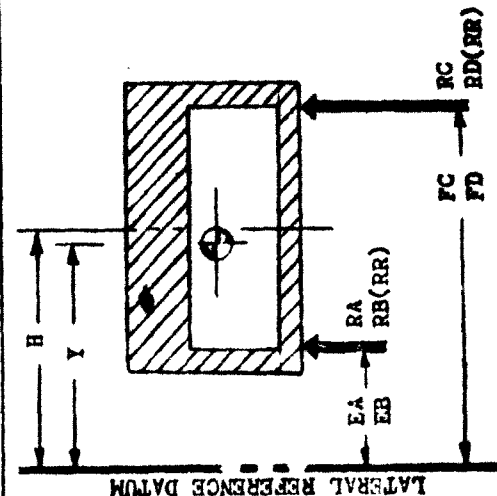
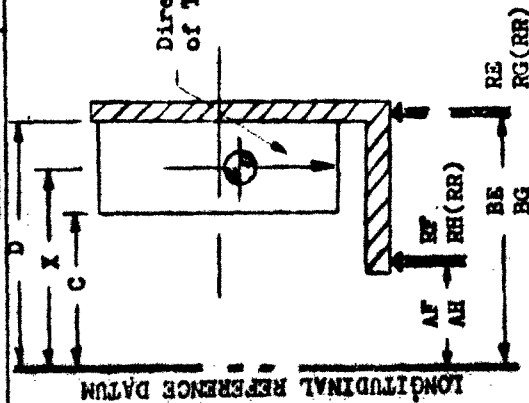


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## 18.4.1 ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE 000 0077 DRAWING NO. 25-25402-36 CHECK LIST NO. 39 REPORT NO. WTS-1114-037  
 MISSILE MODEL WS-135A DCN J REPORTED BY LB/RH PAGE NO. 1 of 4  
 CONFIGURATION ADCN - CHECKED BY BW DATE 11-1-63



## WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	46.75	15.75		31.05	RC	77.30	38.65		38.65
RH	63.20	36.75		26.45	RD	77.00	50.10		26.90
RE	114.20	71.70		42.50	RA	72.50	29.95		42.55
RG	91.95	52.50		39.45	RB	89.15	57.80		31.35
TOTAL	316.10	176.65		139.45	TOTAL	315.95	176.50		139.45

## DIMENSIONAL DATA

DIM.	INCHES	DIM.	INCHES	DIM.	INCHES
AF	42.007	EA	84.510	GB	77.478
AH	42.023	EB	84.505	GD	77.481
BE	62.996	FC	115.490	JA	115.500
BG	62.999	FD	115.495	JC	115.500
C	50.000	H	100.000	M	100.000
D	60.000				

## LONGITUDINAL C.G.

REACTION	NET WT.	ARM	MOMENT
RF	31.05	42.007	
RH	26.45	42.023	
RE	42.50	62.996	
RG	39.45	62.999	
AS WGD	139.45	54.35	7,578.5

## LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	42.55	84.510	
RB	31.35	84.505	
RC	38.65	115.490	
RD	26.90	115.495	
AS WGD	139.45	99.07	13,815.6

## VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	31.35	77.478	
RD	26.90	77.481	
RA	42.55	115.500	
RC	38.65	115.500	
AS WGD	139.45	99.62	13,891.8

(RR) = Rear Reaction

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FORM 100-10 0000037

CHASSIS LIST NO.	18.4.2 MISSILE WEIGHING CHECK LIST	RECORD OF CHECKS (CONT.)			COMPONENT	MISSILE
		Mo	Yr	63		
50	18.4.2	11	1	63		
DATE	NAME					
SECTION	MISSILE NO.					
MISSILE COMPONENT	COMPONENT PART NO.					
DESCRIPTION	PART NO.	WELT	X	Y	Z	7
30	25402-36					
30A	25402-11					
30B	25402-16					
30C	25402-17					
30D	25402-18					
30E	25402-19					
30F	25402-20					
30G	25402-21					
30H	25402-22					
30I	25402-23					
30J	25402-24					
30K	25402-25					
30L	25402-26					
30M	25402-27					
30N	25402-28					
30O	25402-29					
30P	25402-30					
30Q	25402-31					
30R	25402-32					
30S	25402-33					
30T	25402-34					
30U	25402-35					
30V	25402-36					
30W	25402-37					
30X	25402-38					
30Y	25402-39					
30Z	25402-40					
30AA	25402-41					
30AB	25402-42					
30AC	25402-43					
30AD	25402-44					
30AE	25402-45					
30AF	25402-46					
30AG	25402-47					
30AH	25402-48					
30AI	25402-49					
30AJ	25402-50					
30AK	25402-51					
30AL	25402-52					
30AM	25402-53					
30AN	25402-54					
30AO	25402-55					
30AP	25402-56					
30AQ	25402-57					
30AR	25402-58					
30AS	25402-59					
30AT	25402-60					
30AU	25402-61					
30AV	25402-62					
30AW	25402-63					
30AX	25402-64					
30AY	25402-65					
30AZ	25402-66					
30BA	25402-67					
30BB	25402-68					
30BC	25402-69					
30BD	25402-70					
30BE	25402-71					
30BF	25402-72					
30BG	25402-73					
30BH	25402-74					
30BI	25402-75					
30BJ	25402-76					
30BK	25402-77					
30BL	25402-78					
30BM	25402-79					
30BN	25402-80					
30BO	25402-81					
30BP	25402-82					
30BQ	25402-83					
30BR	25402-84					
30BS	25402-85					
30BT	25402-86					
30BU	25402-87					
30BV	25402-88					
30BW	25402-89					
30BX	25402-90					
30BY	25402-91					
30BZ	25402-92					
30CA	25402-93					
30CB	25402-94					
30CC	25402-95					
30CD	25402-96					
30CE	25402-97					
30CF	25402-98					
30CG	25402-99					
30CH	25402-100					

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18.4.3 WEIGHT AND BALANCE CHANGE RECORD											
ASSOCIATE CONTRACTOR		Boeing		CONTRACT NO.		AF 04(647)-289		REPORT NO.		WTS-1114-037	
COMPONENT		Section 39		LOT NO.				DATE		11-1-63	
MODEL NO.		WS-133A		DRAWING NO.		25-25402-36		PREPARED		CB / RH	
SERIAL NO.		0000037		U.O. MISSILE				APPROVED		GO	
EQUIPMENT CHANGE RECORD				WEIGHT AND BALANCE							
PART NO.		DESCRIPTION OF EQUIPMENT		WEIGHT		X AXIS		Y AXIS		Z AXIS	
						ARM		MOMENT		ARM	
1	25-25402-36	Instr. Group Trainer	(as weighed)	139.45		54.35	7,578.5	99.07	13,315.6	99.62	13,891.8
2											
3											
4											
5											
6	AN37194-315	Cable-		3.24		74.2		115.5		102.8	
7	AN37196-315	Cable-		1.34		50.4		106.9		111.4	
8											
9											
10											
11	25-25402-36	Instr. Group Trainer (Complete)		144.03		54.76	7,886.4	99.51	14,333.1	99.80	14,374.1
12											
13											
14											
15											
16											
17											
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32											

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**BEING**

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18.5

# ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO CTLI SECTION S/N 0000037 AND INSTALLATION KIT

The following ECP's have not been incorporated into "Model Specification Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-10-A-DO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-	Operational Raceway Third Stage End Cap Change	3	+1.5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Flare Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-13885	3	Negl.	Yes
373	Work-Around for 10-242-1 CTLI Airt and Batteries	3	Negl.	Yes
398	Ordinance Support Revisions 2-3 Interstage Aft	200	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/E Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

18.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION  
APPLICABLE TO CTLI SECTION S/N 0000037 AND INSTALLATION KIT  
(Continued)

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmers	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 0000039

19.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTLI missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 184 summarizes the complete installation mass properties and consists of data from page 185 (average mass properties of downstage components), page 186 (predicted sealant changes), and page 190 (actual weight of CTLI section S/N 0000039). In addition, page 187 presents summary check lists by production section as backup data for page 185. Page 191 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODs" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

The following drawings are incorporated in the above section:

10-20942, Battery Instl., DCN G 4-30-63.  
21-52910, Missile Instl., DCN K 9-23-63.  
25-23214, Raceway Instl., DCN F 4-29-63.  
25-25402, 39 Sect. Instl., DCN J 6-17-63.  
25-25406, HMS 5-62 Instl., DCN J 9-13-63.  
25-26878, Cable Assy., DCN J 9-3-63.  
25-29239, Conduit Assy., DCN F 4-4-63, ADCN S-34 7-26-63.  
25-30133, Stand. Instl., DCN D 5-22-63.  
25-31677, Instl. Kit, DCN E 5-4-63, ADCN S-22 7-10-63.  
29-22327, Timer Instl., DCN D 6-24-63, ADCN S-6 9-5-63.

19.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000039					REPORT NO. _____ DATE _____					
LINE	S/C	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x 10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	FV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			150.2	54.8	99.9	100.2	.004	.003
5			Silo							
6			Aero							
7	42	O&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			18.0	84.5	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned								
20		Portion								
21			Aero							
22			Base							
23			Jett	- 1.7		58.2	110.2	117.9		
24	46	Interstage 2-3 (Aft)			19.5	65.1	111.7	120.2	0	.001
25			Silo							
26			Aero							
27			Base							
28	47	2nd Stage Engine			25.8	102.1	112.6	121.4	0	.009
29			Silo							
30			Aero							
31			Base							
32			Silo							
33		Jettisoned								
34		Portion								
35			Aero							
36			Base							
37			Jett	- 1.5		55.4	112.1	120.5		
38	47	Interstage 1-2 (Aft)			26.0	74.1	114.7	125.2	0	.002
39			Silo							
40			Aero							
41	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
42			Silo							
43			Aero							
44			Base							
45	49	Skirt			9.9	74.5	119.5	128.4	0	0
46			Silo							
47			Aero							
48			Base							
49	MISSILE					284.1				
50			Silo							
51			Aero							
52			Base							
53			Jett							

2 4550-0-58 \* Boxing Section Stations (See Missile Station Diagram)

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19.2 WEIGHT & BALANCE SUMMARY UNIT (AVERAGE WEIGHT COMPONENTS)					REPORT NO. _____ DATE _____					
2	3	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			SLUG FT SEC <sup>2</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	1	RV Spacer								
2			Silo							
			Aero							
3	1	1st Section			4.22	51.2	107.5	119.6	0	0
4			Silo							
			Aero							
5	2	2nd Section			6.94	67.7	112.	114.3	0	0
6			Silo							
			Aero							
7	3	3rd Stage Engine			17.75	84.5	108.5	117.4	0	.002
8			Silo							
9			Aero							
10			Base							
11	4	Interstage 2-3			-1.90	57.7	110.3	117.8	0	0
12			Silo							
13			Aero							
14			Base							
15			Silo							
16		Jettisoned Portion								
17			Aero							
18			Base							
19			Jett	-1.70		57.7	110.3	117.8		
20	5	Interstage 2-3			19.26	64.9	111.5	117.4	0	.001
21			Silo							
22			Aero							
23	6	2nd Stage Engine			25.77	102.1	112.5	121.4	0	.002
24			Silo							
25			Aero							
26			Base							
27			Silo							
28	7	Interstage 1-2			-1.45	55.4	112.1	119.2	0	0
29			Silo							
30			Aero							
31			Base							
32			Silo							
33		Jettisoned Portion								
34			Aero							
35			Base							
36			Jett	-1.45		55.4	112.1	119.2		
37	8	Interstage 1-2			25.47	73.7	115.2	125.6	0	.002
38			Silo							
39			Aero							
40	9	1st Stage Engine			29.83	111.5	117.7	130.2	0	.025
41			Silo							
42			Aero							
43			Base							
44	9	Boost			9.73	73.9	119.5	128.3	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.79					
49			Silo							
50			Aero							
51			Base							
52			Jett							

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\* Boeing Section Stations (See Missile Station Diagram)

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19.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**					REPORT NO. _____					
					DATE _____					
SLUG	STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA	
						LONG.*	LAT.	VERT.	SLUG STATION-3	ROLL
1	41	RV Spacer								
2			Silo							
3			Aero							
4	50	1st Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	40	2nd Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	40	3rd Stage Engine			.2	80.2	109.5	116.2		
11			Silo							
12			Aero							
13			Base							
14	40	Interstage 2-3 (Swi)			.2	53.6	110.8	116.7		
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Unlabeled Portion	Aero							
20			Base							
21			Jett	.2		53.6	110.8	115.7		
22	40		Interstage 2-3 (Swi)			.2	82.0	103.6	101.8	
23			Silo							
24			Aero							
25	40	3rd Stage Engine								
26			Silo							
27			Aero							
28			Base							
29	40	Interstage 1-2 (Swi)			.2					
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Unlabeled Portion	Aero							
35			Base							
36			Jett							
37	40		Interstage 1-2 (Swi)			.5	24.7	102.2	103.4	
38			Silo							
39			Aero							
40	40	3rd Stage Engine			.8	161.3	116.2	128.2		
41			Silo							
42			Aero							
43			Base							
44	40	3rd			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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REV. SD. P \*\* Reference D2-13954-534

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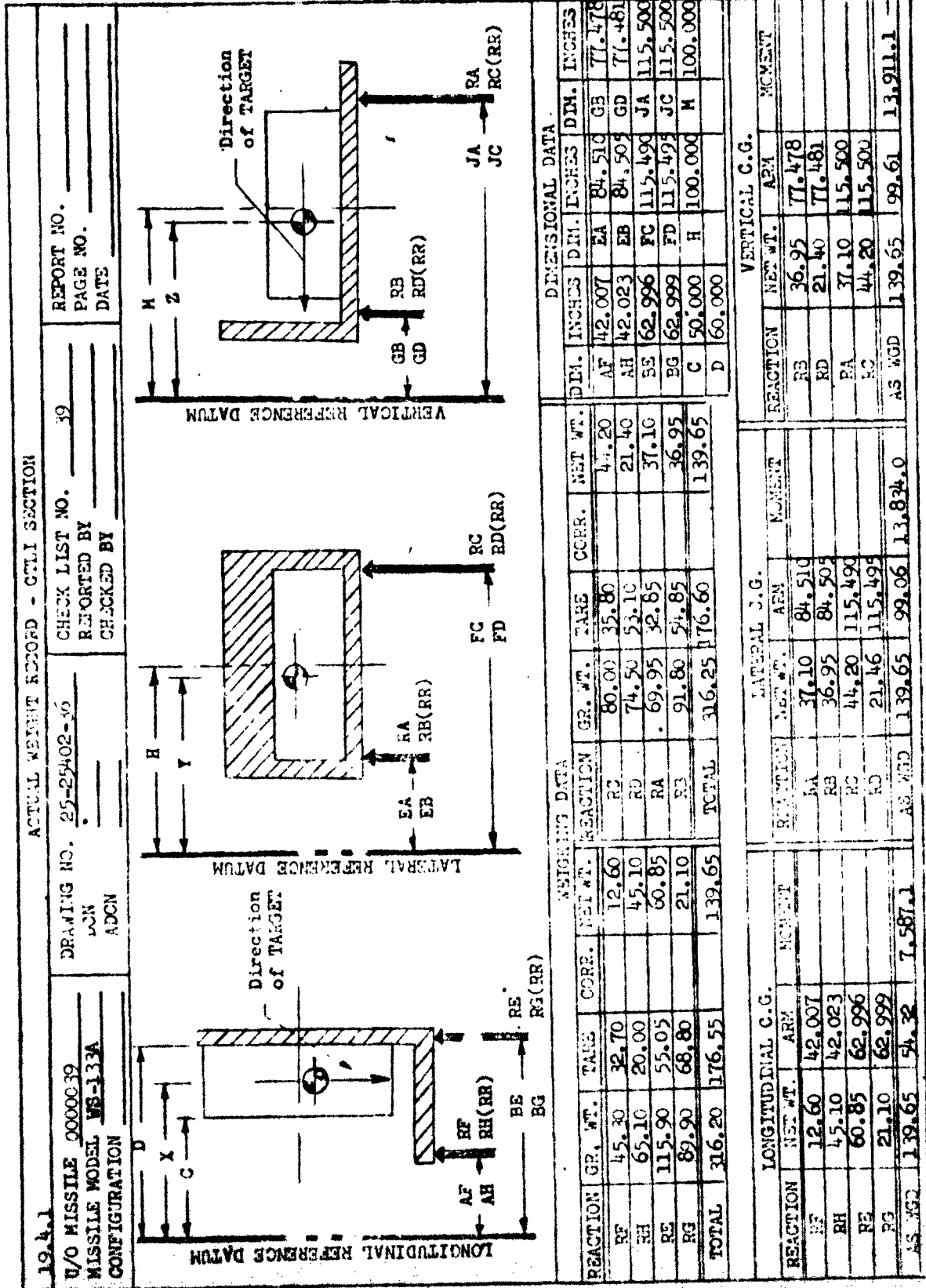
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## 19.5

# ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION

## APPLICABLE TO CTLI SECTION S/H 0000039 AND INSTALLATION KIT

The following ECP's have not been incorporated into "Model Specification Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-B0-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, SAA Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordinance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* The ECP's were incorporated during manufacture of the CTLI wafer. However, the portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

19.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION  
APPLICABLE TO CTMI SECTION S/N 0000039 AND INSTALLATION KIT  
(Continued)

ECP NO. (WS-100A-B0-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmers	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 0000102

20.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTLI missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 193 summarizes the complete installation mass properties and consists of data from page 194 (average mass properties of downstage components), page 195 (predicted sealant changes), and page 197 (actual weight of CTLI section S/N 0000102). In addition, page 196 presents summary check lists by production section as backup data for page 194. Page 200 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AGDS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

The following drawings are incorporated in the above section:

- 10-20942, Battery Instl., DCN G 4-30-63.
- 21-52900, Missile Instl., DCN K 9-23-63.
- 25-23214, Raceway Instl., DCN F 4-29-63.
- 25-25402, 39 Sect. Instl., DCN J 6-17-63.
- 25-25406, HMS 5-62 Instl., DCN J 9-13-63.
- 25-26878, Cable Assy., DCN J 9-3-63.
- 25-29239, Conduit Assy., DCN F 4-4-63, ADCN S-34 7-26-63.
- 25-30133, Stand. Instl., DCN D 5-22-63.
- 25-31677, Instl. Kit, DCN E 5-4-63, ADCN S-22 7-10-63.
- 29-22327, Timer Instl., DCN D 6-24-63, ADCN S-6 9-5-63.

WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000102						REPORT NO. _____ DATE _____				
LINE	ITEM	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> X 10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			148.5	54.8	99.7	100.2	.004	.003
5			Silo							
6			Aero							
7	42	G&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			18.0	84.5	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	46	Interstage 2-3 (Aft)			19.5	65.1	111.7	120.2	0	.001
23			Silo							
24			Aero							
25	40	2nd Stage Engine			25.8	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.5	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett	- 1.5		55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			26.0	74.1	114.7	125.2	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			282.4					
49			Silo							
50			Aero							
51			Base							
52			Jett							

2-580-0 58 \* Boeing Section Stations (See Missile Station Diagram)

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20.2 WEIGHT & BALANCE SUMMARY OTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
LINE	IN	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x 10 <sup>-3</sup>	
						LONG. #	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	OTLI Section			4.39	55.9	107.5	110.6	0	0
5			Silo							
6			Aero							
7	42	OAC Section			6.94	67.5	112.0	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.75	84.5	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.90		57.7	110.3	117.8		
22	45	Interstage 2-3 (Aft)			19.26	64.3	111.8	120.4	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.77	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.45		55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			25.47	73.7	115.0	125.6	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.2	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.73	73.9	119.5	128.3	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.79					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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20.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**					REPORT NO. _____ DATE _____					
STATION NO.	ITEM NO.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTBI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	O&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			.2	53.6	110.8	116.7		
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3 (Aft)			.2	85.0	103.0	101.8		
23			Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			0	-	-	-		
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2 (Aft)			.5	94.7	102.0	103.4		
38			Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Wirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

550-0-58 \* Boeing Section Stations (See Missile Station Diagram)

REV. SYM. F \*\* Reference D2-13954-534

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REV. SYM. F

## ACTUAL WEIGHT RECORD - CTLI SECTION

20.4.1

U/O MISSILE 0000102

DRAWING NO. 25-25402-36

CHECK LIST NO. 39

REPORT NO.

MISSILE MODEL MB-133A

DCN

REPORTED BY CB/RR

PAGE NO.

DATE 11/21/63

CONFIGURATION

ACDN

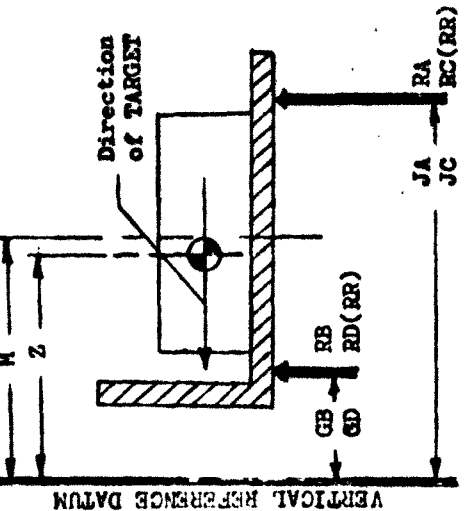
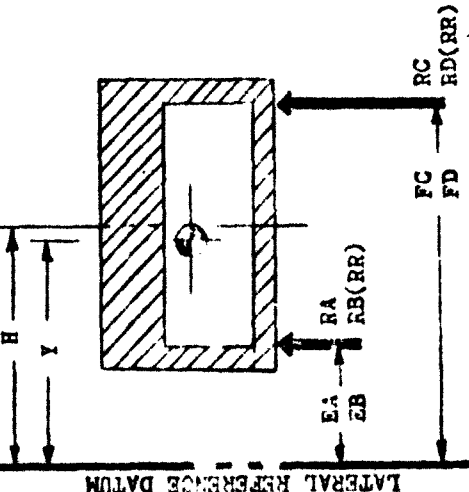
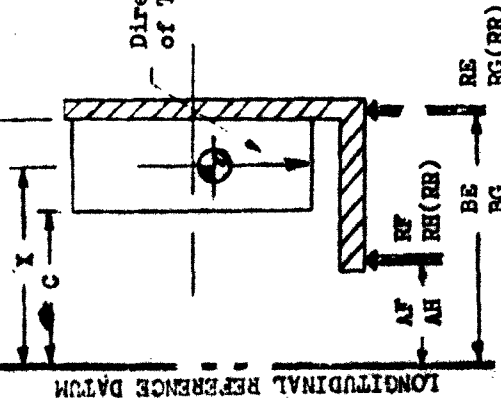
CHECKED BY RH

DATE

Direction of TARGET

Direction of TARGET

Direction of TARGET



## WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	60.65	30.65		30.00	RC	74.40	34.00		40.40
RH	49.00	21.85		27.15	RD	79.75	54.75		25.00
RE	100.20	56.65		43.55	RA	75.45	34.60		40.85
RG	106.05	67.40		38.65	RB	86.30	53.20		33.10
TOTAL	315.90	176.55		139.35	TOTAL	315.90	176.55		139.35

## DIMENSIONAL DATA

DIM.	INCHES	DIM.	INCHES	DIM.	INCHES
EA	42.007	EB	84.510	GB	77.478
AH	42.023	FC	115.490	JA	115.500
BE	62.996	FD	115.493	JC	115.500
BG	62.999	H	100.000	M	100.000
C	50.000				
D	60.000				

## LONGITUDINAL C.G.

REACTION	NET WT.	ARM	MOMENT
RF	30.00	42.007	
RH	27.15	42.023	
RE	43.55	62.996	
RG	38.65	62.999	
AS AGD	139.35	54.39	7,579.5

## LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	40.85	84.510	
RB	33.10	84.505	
RC	40.40	115.490	
RD	25.00	115.495	
AS AGD	139.35	99.05	13,802.5

## VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	33.10	77.478	
RD	25.00	77.481	
RA	40.85	115.500	
RC	40.40	115.500	
AS AGD	139.35	99.65	13,885.9

(RR) = Rear Reaction

2-5550-0-21

20.4.2 MISSILE WEIGHING ON K LIFT

CHECK LIST NO.

30

DATE

MODEL NO.

FIELD NO. 10-24-36

SECTION	MISSILE COMPONENT	DESCRIPTION	P.W.H.	V.T.H.	X.H.T.	Y.H.T.	S.H.T.	COMPLET				MISSILE			
								1	2	3	4	5	6	7	8
32	Testing on K Lift														
33	GMT Structure														
		Support Structure													
		Platform Structure													
		Antenna Structure													
		Platform Structure													
34	GMT Structure														
		Support Structure													
		Platform Structure													
		Antenna Structure													
		Platform Structure													
35	GMT Structure														
		Support Structure													
		Platform Structure													
		Antenna Structure													
		Platform Structure													

2-5550-0-21

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ENDING

NO. D2-13943-1

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REV. 801

WEIGHT AND BALANCE CHANGE RECORD											
20.4.3		ASSOCIATE CONTRACTOR		CONTRACT NO.		REPORT NO.		DATE		11/21/63	
COMPONENT		SECTION 39		LOT NO.		AF04(647)-289		PREPARED		CB/EM	
MODEL NO.		WS-133A		DRAWING NO.		25-25402-36		APPROVED		CO	
SERIAL NO.		0000102		U.O. MISSILE							
EQUIPMENT CHANGE RECORD				WEIGHT AND BALANCE							
LINE	PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS		ARM	MOMENT
				ARM	MOMENT	ARM	MOMENT	ARM	MOMENT		
1	25-25402-36	Instr. Group Trainer (As Weighed)	139.35	54.39	7,579.5	99.05	13,802.5	99.65	13,885.9		
2											
3											
4											
5		ADD:									
6	AE37194-315	Cable-Autonetics	3.22	74.2		115.5			102.8		
7	AE37196-315	Cable-Autonetics	1.34	50.4		106.9			111.4		
8											
9											
10	25-25402-36	Instr. Group Trainer (Complete)	143.91	54.80	7,886.0	99.49	14,317.7	99.83	14,366.2		
11											
12											
13											
14											
15											
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32											

## 20.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION  
APPLICABLE TO CTLI SECTION S/N 0000102 AND INSTALLATION KIT

The following ECP's have not been incorporated into "Model Specification Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-EO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-00000	3	Negl.	Yes
373	Work-Around for 10-20042-1 CTLI Airframe Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 8-5 Interstage Aft	2&3	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

20.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION  
 APPLICABLE TO CILI SECTION S/N 0000102 AND INSTALLATION KIT  
 (Continued)

ECP NO. (WS-17A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmers	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

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CODE IDENT NO. 81205

# 27 Qata 25-87555

(14)  
NUMBER D2-1394311

(6) TITLE CTLI FLIGHT ARTICLE MASS PROPERTIES REPORTS FOR WING I

MRCN 6301 S/N 0000016 AND ON

MODEL NO. WS-133A CONTRACT NO. AF04(694)-46

ISSUE NO. \_\_\_\_\_ ISSUED TO \_\_\_\_\_

(7) NA  
(8) NA  
(9) NA

(11) 23 Apr 63  
(12) 24 P.

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PREPARED BY

(10)  
Vincent Foster

4-23-63

SUPERVISED BY

Roger Wierenga

4-23-63

APPROVED BY

Duane G. Brenden

4-23-63

APPROVED BY

R. G. Grey

4-23-63

CLASS & DISTR

APPROVED BY

R. G. Grey

4-23-63

(DATE)

(20) 4

(21) NA

REV SYM \_\_\_\_\_

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VOL. NO.

SECT.

OF

PAGE 1

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# ACTIVE PAGE RECORD

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			PAGE NO.	REV SYM	PAGE NO.	REV SYM	PAGE NO.	REV SYM				PAGE NO.	REV SYM	PAGE NO.	REV SYM				
	1																		
	2																		
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NO. D2-13943-1

SECT.

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1.2 DISCUSSION	6
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1.4 ENGINEERING CHANGE PROPOSAL SUMMARY	7
1.5 MISSILE STATION DIAGRAM	8
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2.1 DISCUSSION	9
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## SUMMARY

This report presents summary mass properties data for all CELI components to be installed at Vandenberg Air Force Base on the Minuteman missiles including kit weights supplied by other Associate Contractors. The data is to be used in conjunction with the appropriate missile data from Air Force Plant 77 by the Weight Engineer at Vandenberg Air Force Base to complete his report to the Mass Properties Integration Contractor.

1.0 INTRODUCTION

1.1 REFERENCES

- 1.1.1 BSD Exhibit 62-45, "Mass Properties Control Data for WS-133A", Dated 3 August 1962.
- 1.1.2 CCN 258 (BSD-63MSN-2597) to AFO4(647)-580 dated 5 October 1962.
- 1.1.3 Boeing Document D2-13943, "Flight Article Mass Properties Report for CTLI Installations for MRCN 6301 S/N 0000001 - 0000015."
- 1.1.4 Boeing Document D2-13944-501, "Flight Article Mass Properties Report for Missile 501 Components."
- 1.1.5 Boeing Document D2-13945-xxx, "Air Force Plant 77 Flight Article Mass Properties Report for Missile xxx."
- 1.1.6 Boeing Document D2-13954-xxx, "Vandenberg Air Force Base Flight Article Mass Properties Report for CTL Missile xxx."
- 1.1.7 Boeing Document D2-13957-x, "Statistical Means and Dispersions for the Mass Properties of Boeing Components for the Wing I Operational Minuteman Missile."

1.2 DISCUSSION

This weight report for a series of CTLI Installations for Wing I Minuteman missiles is presented in accordance with section 3.1.1 of BSD Exhibit 62-45 (reference 1.1.1) as authorized by CCN 258 to AFO4(647)-580 (reference 1.1.2). This report presents summary mass properties data for all CTLI components to be installed at VAFB including kit weights supplied by other Associate Contractors. It does not include data for CTLI provisions which are incorporated into every production missile (the CTLI "weight penalty") or data remaining unchanged after the original assembly of the missile at Air Force Plant 77. The following pages, therefore, list only the items to be added or changed in the course of the conversion and the mass properties data given on check lists or weight and balance summaries are net changes which must be combined with the appropriate missile data from Plant 77 (reference 1.1.5) and Vandenberg Air Force Base (reference 1.1.6) in order to obtain the mass properties of the complete missile.

Each section of this report will contain one complete CTLI installation data package consisting of (1) a brief discussion of the data, (2) sectional distribution of CTLI components, (3) check lists and change records as required, and (4) a list of Engineering Change Proposals incorporated on the components. Average weights will be used for all components other than the CTLI section which will be an actual weight. Background data for these average weights can be found in reference 1.1.7. Refer to reference 1.1.3 for data covering the installation of CTLI sections from S/N 0000001 through S/N 0000015.

1.3 WEIGHING PROCEDURES

A description of the weighing procedures and an accuracy statement will be found in reference 1.1.4.

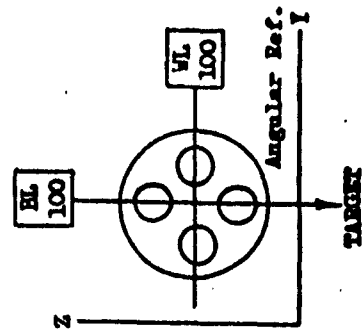
1.4 ENGINEERING CHANGE PROPOSAL (ECP) SUMMARY

See each section of this document for a list of the ECP's incorporated on the Boeing components covered by this report. The ECP's listed are those not covered by the latest revision to "Model Specification, Trainer-Test Group, Guided Missile (S-133-1006)."

1.5 MISSILE STATION DIAGRAM

See page 8 for a missile station diagram for the CTLI installation.

## WING I



**Reference**  
**25-19999**  
**DCM-B**

△ These Missile Stations become 50,000 converted to Boeing Section Stations.

SEPARATION PLANES	MISSILE STA	INTERFACE PLANES	MISSILE STA
S-1	504.420	A	787.055
S-2	346.030	B	750.995
S-3	219.135	C	528.355
S-3 CTLI	209.135	D	469.273
		E	360.340
SKIRT REMOVAL PLANES		F	321.990
SR-1	469.70	G	260.215
SR-2	322.51	H	228.715
		I	155.715
NOZZLE HINGE PLANES			
N-1	778.788	M	228.715
N-2	480.853	N	218.715
N-3	330.090	L CTLI	145.725

## CTLI SECTION, S/N 000 001 6

### 2.1 DISCUSSION

This section of the document describes the data changes created by converting a production line Minuteman missile into a CTLI missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 10 summarizes the complete installation mass properties and consists of data from page 11 (average mass properties of downstage components), page 12 (predicted sealant changes), and page 23 (actual weight of CTLI section S/N 0000016). In addition, pages 13 through 20 present summary check lists by production section as backup data for page 11. Page 24 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet letter SRP: 62:5215:2:6 dated October 5, 1962, and amended by telecon on January 30, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

2.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000016						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG. *	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			150.6	54.8	99.8	100.2		
5			Silo							
6			Aero							
7	42	G&C Section			7.4	66.8	111.9	114.3		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			16.1	81.9	108.3	117.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			21.1	68.6	111.6	120.2		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.3	112.6	121.4		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.4	55.6	112.2	120.6		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.4		55.6	112.2	120.6		
37	47	Interstage 1-2			25.7	73.9	114.8	125.2		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			30.8	111.0	117.7	130.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.6	74.7	119.3	128.6		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			283.9					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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2.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____				
						DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	55.9	107.5	110.6		
5			Silo							
6			Aero							
7	42	G&C Section			6.96	66.9	112.0	114.3		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			15.94	81.9	108.3	117.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.88	57.7	110.3	117.8		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.88		57.7	110.3	117.8		
22	45	Interstage 2-3			20.94	68.4	111.7	120.4		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.3	112.6	121.4		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.41	55.6	112.2	120.6		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.41		55.6	112.2	120.6		
37	47	Interstage 1-2			25.21	73.5	115.1	125.6		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			29.98	109.7	117.7	130.1		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.43	74.1	119.3	128.5		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.29					
49			Silo							
50			Aero							
51			Base							
52			Jett							

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2.2 RMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE*					REPORT NO. _____ DATE _____					
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> -10-3	
						LONG.	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			.2	53.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3			.2	85.0	103.0	101.8		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			0	-	-	-		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2			.5	94.7	102.0	103.4		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

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CHECK LIST NO.		2.3.3 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)			
DATE		MODEL		Mo Day Yr			
		FINAL ASSEMBLY DRAWING NO. 21-52900-4					
SECTION 44		MISSILE NO.		COMPONENT			
MISSILE COMPONENT 3rd STAGE MOTOR		COMPONENT PART NO.		MISSILE			
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT
4a	Cable Assy. Set - Electrical	25-26878-5	6.47	92.9	111.2	118.4	
4b	Conduit Svpt. Set - Raceway	25-29239-7	13.84	82.5	110.5	117.8	
4c	Instl. Kit - Trainer Test Group	25-31677-12	1.65	80.8	110.8	117.9	
4d	RUS 5-62 Installed at VAFB		*				
The following items are furnished by Aerojet							
4e	Destruct System, AODS	359764	4.00	58.1	99.8	114.0	
The following items are deleted from the missile assembly in order to accommodate the CUI installations							
4f	Raceway Instl.	25-23214-5	9.93	80.2	110.2	117.6	
4g	Standards Instl.	25-30133-1	.09	68.5	109.4	116.2	
4h	RUS 5-62 Removed at VAFB		*				

\* See page 12 for a summary of the net weight and balance change of RUS 5-62 at VAFB

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CHECK LIST NO.		2.3.5 MISSILE WEIGHING CHECK LIST										RECORD OF CHECKING (DATE)															
DATE		MODEL		FINAL ASSEMBLY DRAWING NO. 21-52900-4										No													
														Day													
														Yr													
ITEM NUMBER		SECTION 46		MISSILE NO.		COMPONENT PART NO.		WEIGHT		X ARM		Y ARM		Z ARM		BASIC WEIGHT		AS WEIGHED		SHIPMENT		AS RECEIVED		AS WEIGHED		LAUNCH	
		MISSILE COMPONENT		2nd STAGE MOTOR																							
		DESCRIPTION		PART NO.		WEIGHT		X ARM		Y ARM		Z ARM															
6a		Cable Assy. Set - Electrical		25-26878-5		10.75		111.1		112.8		121.2															
6b		Conduit Supt. Set - Raceway		25-29239-7		21.86		109.8		112.2		121.2															
6c		Instl. Kit - Trainer Test Group		25-31677-12		1.90		88.9		111.8		120.4															
6d		Timer - Interval		29-22327-2		1.50		67.1		112.5		121.8															
6e		Battery - Squib Activated		10-20942-3		1.40		63.9		112.5		121.8															
6f		RWS 5-62 Installed at VAFB				*																					
The following items are furnished by Aerojet																											
6g		Destruct System, AODS		359764		4.19		74.8		111.8		120.4															
The following items are deleted from the missile assembly in order to accommodate the CUI Installation																											
6h		Raceway Instl.		25-23214-5		15.87		103.0		111.9		120.7															
6i		RWS 5-62 Removed At VAFB				*																					

\* See page 12 for a summary of the net weight and balance change of RWS 5-62 at VAFB

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\* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

CHECK LIST NO.		2.3.7 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)			
DATE		MODEL		FINAL ASSEMBLY DRAWING NO. 21-52900-4			
ITEM NUMBER		SECTION 48		MISSILE NO.			
MISSILE COMPONENT 1st STAGE MOTOR		COMPONENT PART NO.		COMPONENT			
DESCRIPTION		PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	LAUNCH
8a	Cable Assy. Set - Electrical	25-26878-5	13.12	156.4	118.2	130.5	
8b	Conduit Supt. Set	25-29239-7	13.18	77.1	117.3	130.0	
8c	Instl. Kit - Trainer Test	25-31677-12	2.67	78.2	117.2	129.5	
8d	Timer - Interval	29-22327-1	1.50	70.6	117.7	130.5	
8e	Battery - Squib Activated	10-20942-3	1.40	66.7	117.7	130.5	
8f	BMS 5-62 Instl. at VAFB		*				
The following items are furnished by Aerojet							
8g	Destruct System, AODS	359764	6.19	78.1	116.9	129.3	
The following items are deleted from the missile assembly in order to accommodate the CMI Installation							
8h	Reentry Instl.	25-23214-5	8.08	82.9	117.2	129.8	
8i	BMS 5-62 Removed at VAFB		*				

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\* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

\* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

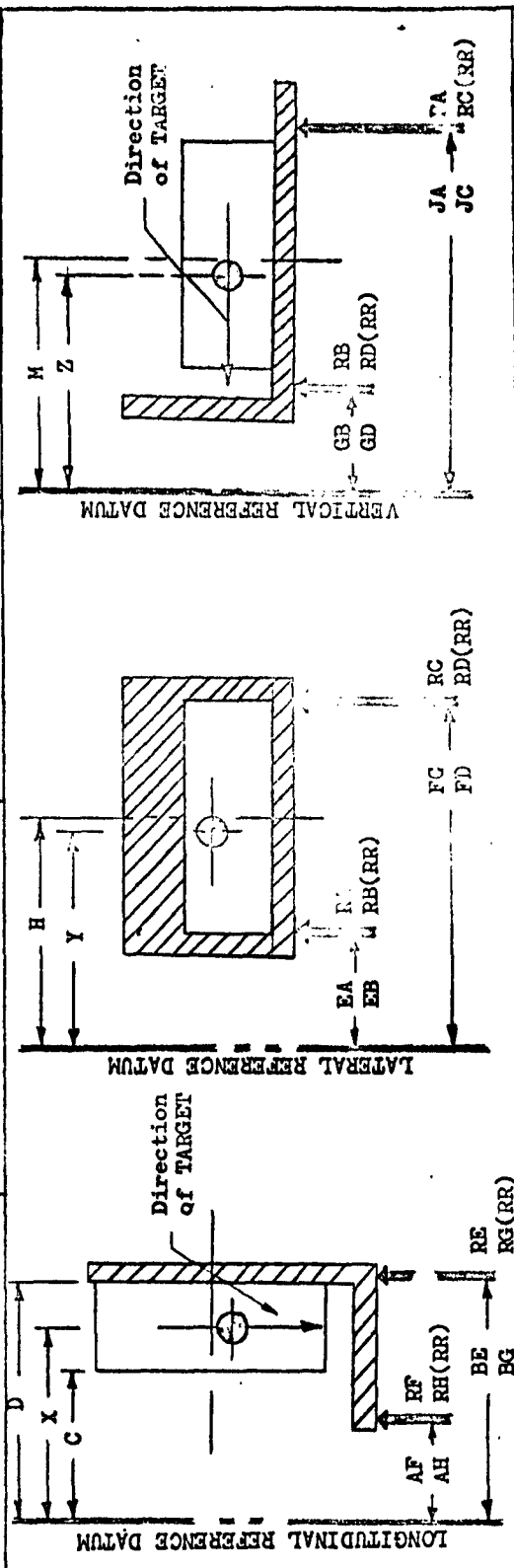
2.4.1

U/O MISSILE 0000016  
MISSILE MODEL 105-133  
CONFIGURATION

LAWING NO. 25-25402-17  
• F  
DCN  
ADCN 21

CHECK LIST NO. 39  
REPORTED BY CB/NB  
CHECKED BY GVR

REPORT NO. Wts. - 975-016  
PAGE NO. \_\_\_\_\_  
DATE 3/11/63



WEIGHING DATA										DIMENSIONAL DATA					
REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.	DEI.	INCHES	DIM. INCHES	DIM.	INCHES	
RF	32.65	5.13		27.50	FC	62.05	40.00		22.05	AF	42.007	EA	84.510	GB	77.473
RH	12.75	42.00		30.75	RD	65.85	43.50		22.35	AH	42.023	EB	84.535	GD	77.487
RE	123.80	76.50		46.90	RA	62.00	23.25		38.75	BE	62.086	FC	115.490	JA	115.503
RG	76.60	41.70		34.90	RB	64.95	59.15		5.80	CG	62.069	FD	115.495	JC	115.506
TOTAL	305.80	165.75		140.05	TOTAL	305.75	165.70		140.05	B	50.000	H	100.000	M	100.000
										D	60.000				

LONGITUDINAL C. G.				LATERAL C. G.				VERTICAL C. G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	27.50	42.007		RA	38.75	84.510		RB	35.80	77.478	
RH	30.75	42.023		RB	35.80	84.505		RD	22.55	77.481	
RE	46.90	62.996		RC	42.95	115.497		RA	38.75	115.500	
RG	34.90	62.999		RD	22.55	115.495		RC	42.95	115.500	
AS WGD	140.05	54.27	7,600.6	AS WGD	140.05	99.00	13,864.7	AS WGD	140.05	99.66	13,957.3

**(RR) = Rear Reaction**

SERIAL NUMBER: 0000016

CHECK LIST NO. 39	DATE	2.4.2 MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE)				COMPONENT	MISSILE					
			Mo	Day	Yr								
MODEL MS-133A			FINAL ASSEMBLY DRAWING NO. 25-25402-17										
SECTION 39		MISSILE NO.											
MISSILE COMPONENT CMLI		COMPONENT PART NO. Noted											
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	REMOTE SITE SHIPMENT	REMOTE SITE	AS WEIGHED	REMOTE SITE	LAUNCH
39	Instrumentation Group-Trainer Test	25-25402-17					-	-					
39a	CMLI Structure Assy.	25-25403-11					-	-					
	Supt. Structure	25-29094-15					x	x					
	Primary Structure	25-29093-15					x	x					
	Insulation & Ext. Mark	25-29095-3					x	x					
	Antenna & Spacer	25-29096-3					x	x					
	Plate - Ident.	21-51600-329					x	x					
39b	Cable & Equipment Instl.	25-25404-12					-	-					
	Battery Souib	10-20942-2					x	x					
	Battery Souib	10-20942-1					x	x					
	Cable Set SE-35A	55008-106					-	-					
	Cable	AN 31277-315					x	x					
	Cable	AN 31278-315					x	o					
	Cable	AN 31279-315					x	o					
39c	Kit Installation (EXP 525)	25-25402-21					x	x					

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**WEIGHT AND BALANCE CHANGE RECORD**

ASSOCIATE CONTRACTOR	REPORT NO.
COMPONENT	DATE
MODEL NO.	PREPARED
SERIAL NO.	APPROVED

CONTRACT NO. AF04(647)-289

LOT NO. 25-25402-17

DRAWING NO. U.O. MISSILE

SECTION 39

WS-133A

0000016

WTS-975-016

3-11-63

CB/WB

GVR

EQUIPMENT CHANGE RECORD		WEIGHT AND BALANCE							
PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS		
			ARM	MOMENT	ARM	MOMENT	ARM	MOMENT	
1									
2	Instr. Group-Trainer, Test (As Wgd)	140.05	54.27	7,600.6	99.00	13,864.7	99.66	13,957.3	
3									
4									
5	ADD:								
6	Cable Autonetics	3.85	74.2		115.5		102.8		
7	Cable Autonetics	2.10	50.4		106.9		111.4		
8									
9									
10	DEDUCT:	0							
11									
12									
13									
14									
15	Instr. Group-Trainer, Test (Comp.)	146.00	54.74	7,522.1	99.55	14,533.9	99.91	14,587.0	
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
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29									
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31									
32									

## 2.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION**  
**APPLICABLE TO CTLI SECTION S/N 0000016 AND INSTALLATION KIT.**

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 31 October 1962. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

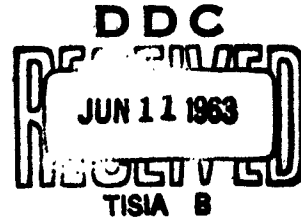
ECP NO. (WS-133A-EO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	1	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&G Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20075	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
506	CTLI Raceway Cover Revision	1	- .2	Yes
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

THE **BOEING** COMPANY.

CODE IDENT NO. 81205



NUMBER D2-13943-1

TITLE WING I CTLI FLIGHT ARTICLE MASS PROPERTIES REPORTS FOR  
THE INSTALLATION OF MRCN 6301 CTLI SECTION (S/N 0000016 AND ON)

MODEL NO. WS-133A CONTRACT NO. AFO4(694)-46

ISSUE NO. 9 ISSUED TO ASTIA

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PREPARED BY	<u>Vincent Foster</u> Vincent Foster	<u>4-23-63</u>
SUPERVISED BY	<u>Roger C. Wierenza</u> Roger C. Wierenza	<u>4-23-63</u>
APPROVED BY	<u>Duane C. Brenden</u> Duane C. Brenden	<u>4-23-63</u>
APPROVED BY	<u>R. G. Grey</u> R. G. Grey	<u>4-23-63</u>
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REV SYM A

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			PAGE NO.	REV SYM	PAGE NO.	REV SYM	PAGE NO.	REV SYM			PAGE NO.	REV SYM	PAGE NO.	REV SYM	PAGE NO.
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	A A A A  A													
			25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42	A A A A A A A A A A A A A A A A A A											

US 4001 0000 ORIG. 2/61

2-8142-2

REV SYM A

**BOEING**

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SECT.

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2.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000016						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10-3	
						LONG. *	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			150.6	54.8	99.8	100.2	.004	.002
5			Silo							
6			Aero							
7	42	G&C Section			7.4	66.8	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			16.1	81.9	108.3	117.2	0	.001
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			21.1	68.6	111.6	120.2	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.3	112.6	121.4	0	.008
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.4	55.6	112.2	120.6	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.4		55.6	112.2	120.6		
37	47	Interstage 1-2			25.7	73.9	114.8	125.2	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			30.8	111.0	117.7	130.0	0	.027
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.6	74.7	119.3	128.6	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			283.9					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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CTLI SECTION, S/N 0000017

3.1

This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 26 summarizes the complete installation mass properties and consists of data from page 27 (average mass properties of downstage components), page 28 (predicted sealant changes), and page 32 (actual weight of CTLI section S/N 0000017). In addition, page 29 presents summary check lists by production section as backup data for page 27. Page 33 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMFD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

3.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000017						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			150.4	54.7	99.8	100.3	.004	.002
5			Silo							
6			Aero							
7	42	G&C Section			7.4	66.8	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			16.1	81.9	108.3	117.2	0	.001
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			21.1	68.6	111.6	120.2	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.3	112.6	121.4	0	.008
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.4	55.6	112.2	120.6	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.4		55.6	112.2	120.6		
37	47	Interstage 1-2			25.7	73.9	114.8	125.2	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			30.8	111.0	117.7	130.0	0	.027
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.6	74.7	119.3	128.6	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			283.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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3.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x 10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	55.9	107.5	110.6		
5			Silo							
6			Aero							
7	42	G&C Section			6.96	66.9	112.0	114.3		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			15.94	81.9	108.3	117.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.88	57.7	110.3	117.8		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.88		57.7	110.3	117.8		
22	45	Interstage 2-3			20.94	68.4	111.7	120.4		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.3	112.6	121.4		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.41	55.6	112.2	120.6		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.41		55.6	112.2	120.6		
37	47	Interstage 1-2			25.21	73.5	115.1	125.6		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			29.98	109.7	117.7	130.1		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.43	74.1	119.3	128.5		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.29					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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3.2 EMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**						REPORT NO. _____				
						DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> ×10 <sup>-3</sup>	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			.2	53.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3			.2	85.0	103.0	101.8		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			0	-	-	-		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2			.5	94.7	102.0	103.4		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\*\* Reference D2-13954-534

2-5550-0-58 \* Boeing Section Stations  
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Diagram)

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3.4.1 ACTUAL WEIGHT RECORD - CTLI SECTION			
U/O MISSILE 0000017		REPORT NO. WTS-997-017	
MISSILE MODEL WS-133A		PAGE NO. _____	
CONFIGURATION		DATE 4/28/63	
DRAWING NO. 25-25402-35		CHECK LIST NO. 39	
DCN 7H		REPORTED BY CB	
ADCN 23		CHECKED BY GVR	

LONGITUDINAL REFERENCE DATUM

LATERAL REFERENCE DATUM

VERTICAL REFERENCE DATUM

WEIGHING DATA				DIMENSIONAL DATA				
REACTION	GR. WT.	TARE	CORR.	NET WT.	DIM. INCHES	DIM. INCHES	DIM. INCHES	
RF	51.65	24.55		27.10	AF	42.007	EA	84.510
RH	53.90	22.60		31.30	AH	42.023	EB	84.505
RE	104.15	57.15		47.00	BE	62.996	FC	115.499
RG	95.40	61.05		34.35	BG	62.999	FD	115.495
TOTAL	305.10	165.35		139.75	C	50.000	H	100.000
					D	60.000	M	100.000

LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	27.10	42.007		RA	48.00	84.510		RB	26.55	77.478	
RH	31.30	42.023		RB	26.55	84.505		RD	31.60	77.481	
RE	47.00	62.996		RC	33.60	115.499		RA	48.00	115.500	
RG	34.35	62.999		RD	31.60	115.495		RC	33.60	115.500	
AS XGD	139.75	54.23	7,578.5	AS XGD	139.75	98.96	13,830.2	AS XGD	139.75	99.68	13,930.2

(RR) = Rear Reaction

SERIAL NUMBER: 0000017

3.4.2 MISSILE WEIGHING CHECK LIST  
MODEL WS-133A FINAL ASSEMBLY DRAWING NO. 25-25402-35

RECORD OF CHECKING (DATE)			
Mo	4		
Day	28		
Yr	63		

ITEM NUMBER	SECTION 39	MISSILE COMPONENT CTLI	MISSILE NO.	COMPONENT PART NO. Noted				COMPONENT				MISSILE			
		DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	REMOTE SITE SHIPMENT	AS RECEIVED	AS WEIGHED	REMOTE SITE	LAUNCH	
39		Instrumentation Group, Trainer-Test	25-25402-35												
39a		CTLI Structure Assembly	25-25403-11												
		Support Structure	25-29094-45					X	X						
		Primary Structure	25-29093-15					X	X						
		Insulation & External Markings	25-29095-3					X	X						
		Antenna & Spacer	25-29096-3					X	X						
		Plate - Identification	21-51600-329					X	X						
39b		Cable & Equipment Installation	25-25404-12												
		Battery, Squib	10-20242-1					X	X						
		Battery, Squib	10-20242-2					X	X						
		Cable Set SE-35A	55008-106												
		Cable	AN 31277-315					X	X						
		Cable	AN 31278-315					X	X						
		Cable	AN 31279-315					X	X						
39c		Kit Installation (ECP 525)	25-25402-21					X	X						
39d		Kit Installation (ECP 551)	25-25402-26					X	X						
39e		Kit Installation (ECP 578)	25-25402-34					X	X						

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## 3.5

# ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO CTLI SECTION S/N 0000017 AND INSTALLATION KIT

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 31 October 1962. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
506	CTLI Raceway Cover Revision	1	- .2	Yes
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

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**CTLI SECTION, S/N 0000018**

**4.1**

This section of the document describes the data changes created by converting a production line Minuteman missile into a CTLI missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check list, and ECP lists applicable to this installation. Page 35 summarizes the complete installation mass properties and consists of data from page 36 (average mass properties of downstage components), page 37 (predicted sealant changes), and page 41 (actual weight of CTLI section S/N 0000018). In addition, page 38 presents summary check lists by production section as backup data for page 36. Page 42 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight...

4.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000018						REPORT NO. _____ DATE _____				
LINE	SEQ.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x 10 <sup>-3</sup>	
						LONG. °	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			150.4	54.8	99.7	100.3	.004	.002
5			Silo							
6			Aero							
7	42	G&C Section			7.4	66.8	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			16.1	81.9	108.3	117.2	0	.001
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			21.1	68.6	111.6	120.2	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.3	112.6	121.4	0	.008
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.4	55.6	112.2	120.6	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.4		55.6	112.2	120.6		
37	47	Interstage 1-2			25.7	73.9	114.8	125.2	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			30.8	111.0	117.7	130.0	0	.027
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.6	74.7	119.3	128.6	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			283.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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4.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> x10-3	
						LONG.#	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	55.9	107.5	110.6		
5			Silo							
6			Aero							
7	42	G&C Section			6.96	66.9	112.0	114.3		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			15.94	81.9	108.3	117.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.88	57.7	110.3	117.8		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.88		57.7	110.3	117.8		
22	45	Interstage 2-3			20.94	68.4	111.7	120.4		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.3	112.6	121.4		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.41	55.6	112.2	120.6		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.41		55.6	112.2	120.6		
37	47	Interstage 1-2			25.21	73.5	115.1	125.6		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			29.98	109.7	117.7	130.1		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.43	74.1	119.3	128.5		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.29					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boozing Section Stations (See Missile Station Diagram)

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4.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT <sup>2</sup> 10-3	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			.2	53.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3			.2	85.0	103.0	101.8		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			0	-	-	-		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2			.5	94.7	102.0	103.4		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

\* Boeing Section Stations (See Missile Station Diagram)

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\*\* Reference D2-13954-534

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A

SEC

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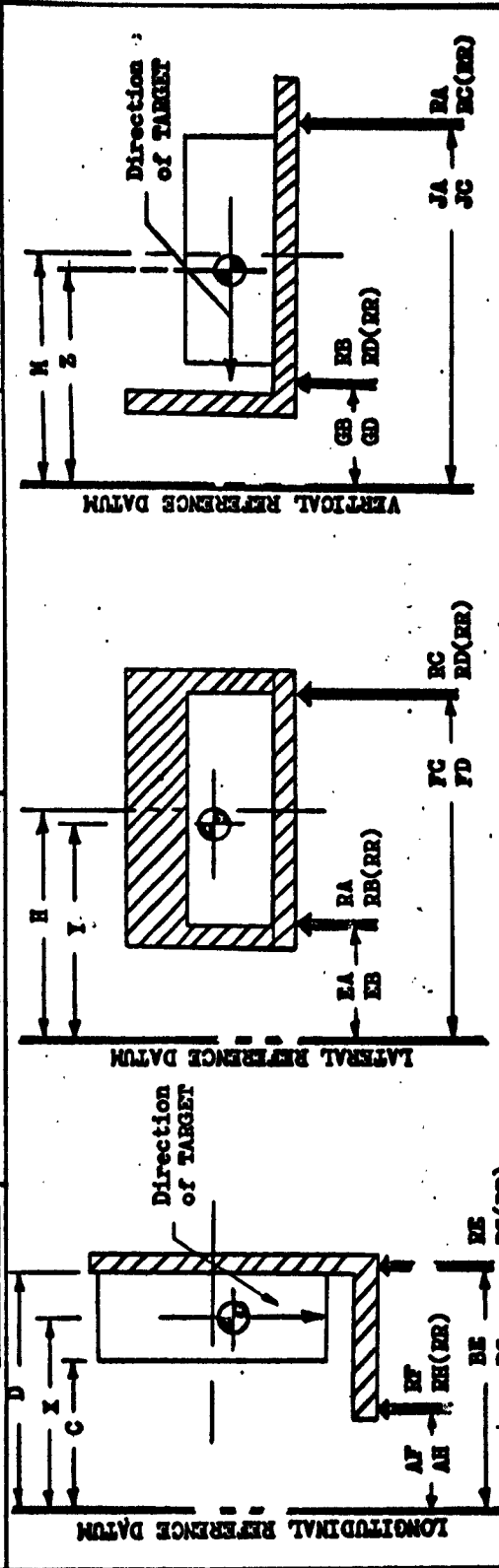
CHECK LIST NO.		4.3 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)				
DATE		MODEL	FINAL ASSEMBLY DRAWING NO. 21-52900-4	Mo	Day	Yr		
ITEM NUMBER	SECTION 39 THRU 49		MISSILE NO.	COMPONENT				MISSILE
	MISSILE COMPONENT		COMPONENT PART NO.					
	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED
								REMOTE SITE SHIPMENT
								REMOTE SITE
								AS RECEIVED
								REMOTE SITE
								AS WEIGHED
								REMOTE SITE
								LAUNCH

SUMMARY CHECK LISTS FOR SECTIONS 39 THROUGH 49 ARE IDENTICAL TO  
THOSE FOUND ON PAGES 13 THROUGH 20.

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4.41 ACTUAL WEIGHT RECORD - CILI SECTION

U/O MISSILE 000018 DRAWING NO. 25-25402-35 CHECK LIST NO. 39 REPORT NO. WTS-1002-018  
 MISSILE MODEL WS-133A DCN H REPORTED BY CB/CH PAGE NO. 5/7/63  
 CONFIGURATION ADCH 23 GVR



WEIGHING DATA										DIMENSIONAL DATA					
REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.	DIM.	INCHES	DIM.	INCHES	DIM.	INCHES
RF	46.60	16.85		29.75	RC	62.30	24.00		38.30	AF	42.007	EA	84.510	GB	77.476
RH	58.95	30.60		28.35	RD	86.15	59.55		26.60	AR	42.023	EB	84.505	GD	77.481
RE	109.25	65.05		44.20	RA	82.50	39.00		43.50	BE	62.996	FC	115.490	JA	115.500
RG	90.65	53.10		37.55	RB	74.50	43.05		31.45	BG	62.999	FD	115.495	JC	115.500
TOTAL	305.45	165.60		139.85	TOTAL	305.45	165.60		139.85	C	50.000	H	100.000	N	100.000
										D	60.000				

LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	29.75	42.007		RA	43.50	84.510		RB	31.45	77.476	
RH	28.35	42.023		RB	31.45	84.505		RD	26.60	77.481	
RE	44.20	62.996		RC	38.30	115.490		RA	43.50	115.500	
RG	37.55	62.999		RD	26.60	115.495		RC	38.30	115.500	
AS WCD	139.85	74.28	1,591.1	AS WCD	139.85	98.89	13,829.3	AS WCD	139.85	99.72	13,945.6

(RR) = Rear Reaction

BOEING  
NO. 25-25402-35  
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SERIAL NUMBER: 0000018

4.4.2 MISSILE WEIGHING CHECK LIST  
MODEL W8-133A FINAL ASSEMBLY DRAWING NO. 25-25402-35

CHECK LIST NO. 39	DATE	SECTION 39	MISSILE NO.	RECORD OF CHECKING (DATE)				COMPONENT				MISSILE	
				Mo	Day	Yr	AS WEIGHED	AS RECEIVED	SHIPMENT	AS WEIGHED	AS RECEIVED		SHIPMENT
		MISSILE COMPONENT CTEI	COMPONENT PART NO. Noted	WEIGHT	X ARM	Y ARM	Z ARM	AS WEIGHED	AS RECEIVED	SHIPMENT	AS WEIGHED	AS RECEIVED	SHIPMENT
ITEM NUMBER		DESCRIPTION	PART NO.										
39		Instrumentation Group, Trainer-Test	25-25402-35										
39a		CTEI Structure Assembly	25-25403-11										
		Support Structure	25-29094-15										
		Primary Structure	25-29093-15										
		Insulation & External Marking	25-29095-3										
		Antenna & Spacer	25-29096-3										
		Plate - Identification	21-51600-329										
39b		Cable & Equipment Installation	25-25404-12										
		Battery, Squib	10-20942-1										
		Battery, Squib	10-20942-2										
		Cable Set SE-35A	55008-106										
		Cable	AN 31277-315										
		Cable	AN 31278-315										
		Cable	AN 31279-315										
39c		Kit Installation (EXP 525)	25-25402-21										
39d		Kit Installation (EXP 551)	25-25402-26										
39e		Kit Installation (EXP 576)	25-25402-34										

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REVISIONS

NO. 5

WEIGHT AND BALANCE CHANGE RECORD													
4.4.3		ASSOCIATE CONTRACTOR		BOEING		CONTRACT NO.		AF04(647)-289		REPORT NO.		WTS-1002-018	
COMPONENT		SECTION 39		LOT NO.		DRAWING NO.		25-25402-35		DATE		5/7/63	
MODEL NO.		HS-133A		U.O. MISSILE		APPROVED		GVR		PREPARED		CB	
SERIAL NO.		0000018											
EQUIPMENT CHANGE RECORD				WEIGHT AND BALANCE									
PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS ARM	X AXIS MOMENT	Y AXIS ARM	Y AXIS MOMENT	Z AXIS ARM	Z AXIS MOMENT					
1													
2	25-25402-35 Instr. Group, Trainer-Test (As Weighed)	139.85	54.28	7,591.1	98.89	13,829.3	99.72	13,945.6					
3													
4													
5	ADD:												
6	AF31278-315 Cable Autonetics	3.85	74.2		115.5		102.8						
7	AF31279-315 Cable Autonetics	2.08	50.4		106.9		111.4						
8													
9													
10	DEDUCT:	0											
11													
12													
13													
14	25-25402-35 Instr. Group, Trainer-Test (Complete)	145.78	54.75	7,981.6	99.43	14,496.3	99.97	14,573.1					
15													
16													
17													
18													
19													
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31													
32													

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**4.5 ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION  
APPLICABLE TO CTLI SECTION 8/M 0000018 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 31 October 1962. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
506	CTLI Raceway Cover Revision	1	- .2	Yes
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes

\* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

\*\* These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

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PHILADELPHIA 12, PENNSYLVANIA  
AERONAUTICAL MATERIALS LABORATORY  
MATERIALS APPLICATION AND ENGINEERING DIVISION

DATE 29 January 1963

REPORT NO. NAEC-AML-1611

MS21046(ASG) NUTS, SELF-LOCKING,  
HEXAGON-REGULAR HEIGHT, 800°F, 125 KSI FTU,  
KAYNAR MANUFACTURING COMPANY, INCORPORATED,  
QUALIFICATION TESTING OF

PAN C 48 AE 34-9  
UNDER BUREAU OF NAVAL WEAPONS  
WEPTASK NO. RAE 30C 004/200 1/F012 14 01

Purpose

Reference (a) established a continuing project for the Naval Air Engineering Center to conduct evaluation tests on self-locking nuts.

2. Data

Tests were conducted for conformance to references (b) and (c), and the results are listed in Plates 1 through 4. These results cover Kaynar Manufacturing Company, Incorporated Part Number H56-04 and H56-08 as listed respectively in references (d) and (e). The samples are all-metal, one-piece, forged nuts with the upper threaded section elliptically offset to produce the self-locking action. The finish is silver plating. Samples were received in December of 1962, and the tests were completed in January 1963.

3. Conclusions

The self-locking nuts reported herein have successfully met the requirements of reference (b) and (c).

4. Action

Kaynar Manufacturing Company, Incorporated P/N's H56-04 and H56-08 are being included on the appropriate Qualified Products List.

Prepared by:

M. J. Zarko  
M. J. Zarko  
Project Engineer

Approved by:

B. R. Silverman  
B. R. Silverman, Head  
Mechanical Systems Branch

DDC  
MAY 21 1963  
TISIA A

NO OTS

REFERENCES

- (a) BUWEPS ltr RAAE-343/4:GDN of 1 March 1961
- (b) Military Specification MIL-N-25027B(ASG) Amendment-1, Nut, Self-Locking, 250°F, 450°F, and 800°F, 125 ksi FTU, 60 ksi FTU, and 30 ksi FTU of 10 October 1962
- (c) Military Standard MS21046(ASG) Nuts, Self-Locking, Hexagon-Regular Height, 800°F, 125 ksi FTU of 11 September 1962
- (d) Kaynar Manufacturing Company, Incorporated, Engineering Research Test Report ERM2249C of 6 November 1962
- (e) Kaynar Manufacturing Company, Incorporated, Engineering Research Test Report ERM2251C of 10 December 1962

PLATES

- 1 - Test Results, Nuts, Self-Locking, Hexagon-Regular Height, 800°F, 125 ksi FTU, Size 4-40 (Kaynar)
- 2 - Dimensional Analysis of 4-40 Size
- 3 - Test Results, Nuts, Self-Locking, Hexagon-Regular Height, 800°F, 125 ksi FTU, Size 8-32 (Kaynar)
- 4 - Dimensional Analysis of 8-32 Size

KAYNAR P/N H56-04 SIZE 4-40 UNC-3B

GOVERNMENT DESIGNATION MS81046C04 PROCUREMENT SPEC. MIL-N-25027B  
TORQUE -- (INCH-POUNDS)

TEST	SAMPLE NO.	INSTALLATION TORQUE	FIRST REMOVAL		SEVENTH INSTALLATION	SEVENTH REMOVAL		FIFTEENTH REMOVAL		MAXIMUM TORQUE
			STARTING	PREVAILING		STARTING	PREVAILING	STARTING	PREVAILING	
AS RECEIVED CONDITION	1		1.7			1.5		1.3	1.2	2.4
	2		2.1			1.8		1.7	1.6	3.0
	3		2.0			1.9		1.4	1.3	2.8
	4		2.3			1.9		2.1	2.0	2.9
	5		1.8			1.1		1.2	1.0	2.5
	6		1.7			1.0		1.0	0.9	2.3
	7		1.9			1.3		1.2	1.2	2.4
	8		1.7			1.3		1.1	1.0	2.6
	9		1.8			1.2		1.1	1.0	2.7
	10		1.8			1.3		1.3	1.2	2.4
AVERAGE VALUE										
SPECIFIED VALUE									MIN. 0	MAX. 5.0
ROOM TEMPERATURE AFTER BAKE AT 300°F	11	2.1	5.7			1.8		2.0	1.9	5.7
	12	3.0	7.9			3.5		2.2	3.0	7.9
	13	2.8	6.0			2.6		2.8	2.0	6.0
	14	2.2	5.9			2.2		2.3	1.9	5.9
	15	3.0	8.2			3.0		3.0	2.9	8.2
	16	1.9	4.7			2.0		2.0	1.9	4.7
	17	2.3	5.0			2.8		3.0	2.1	5.0
	18	2.6	6.0			2.2		3.1	2.0	6.0
	19	1.9	4.9			1.9		2.0	1.8	4.9
	20	2.0	6.1			2.2		2.2	2.0	6.1
AVERAGE VALUE										
SPECIFIED VALUE									MIN. 0	MAX. 10.0
AT HEAT - 300°F	21	1.1		5.0						
	22	1.2		2.8						
	23	2.0		7.5						
	24	1.2		2.7						
	25	1.0		4.2						
	26	1.2		6.2						
	27	0.9		2.9						
	28	1.0		2.6						
	29	1.8		6.1						
	30	1.1		4.8						
AVERAGE VALUE										
SPECIFIED VALUE									MIN. 0	MAX. 7.5

NOTE: FOR TESTS CONDUCTED UNDER MIL-N-25027 AND MIL-P-18240A THE TORQUE VALUES LISTED UNDER "STARTING TORQUE" WILL MEAN "MAXIMUM LOCKING TORQUE" AND VALUES LISTED UNDER "PREVAILING TORQUE" WILL MEAN "MINIMUM BREAKAWAY TORQUE".